A STUDY OF EQUITY IN A MULTI-INSTITUTION COMMUNITY COLLEGE SYSTEM PRIOR TO AND AFTER IMPLEMENTING PERFORMANCE-BASED FUNDING

By

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The purpose of this study was to extend the concept of horizontal equity as it related to public school equity studies to a public community college system prior to and after the implementation of performance-based funding.

Horizontal equity according to educational finance was the "equal treatment of equals" and was one of the objectives sought in community college funding. The degree of horizontal equity was analyzed on Florida's funding formula for the 28 public community colleges using statistical measures range, restricted range, federal range ratio, coefficient of variation, McLoone index, the Gini coefficient, and the Lorenze curve. The variable used was "total revenue per full-time equivalent student" where total revenue was the sum of the state's general revenue allocation, lottery proceeds, and student tuition and fees. The degree of equity was analyzed the year prior to and after the

implementation of performance-based funding to examine if the performance-based allocation made a difference in horizontal equity.

The results of all data analyzed according to the statistical measures indicated that the degree of equity was better prior to the implementation of performance-based funding. The degree of equity for the funding formula decreased slightly when the performance-based allocation was added to the funding formula. The funding model was used to project what would happen to horizontal equity when the performance allocation was 6%, 12%, 25%, 50% and 75% of total revenue. Results of the projections indicated that the degree of equity greatly decreased when the performance-based allocation reached 25% or higher of total revenue.

There were two conclusions. The first conclusion was based on the applicability of the six statistical measurements prevalent to public school equity studies extended to community college equity studies. The six statistical measurements used in the study were sensitive to changes in per-student revenue and therefore, applicable to community college equity studies. The second conclusion included recommendations based on the results of the study that indicated the funding formula for the 28 public community colleges in the state of Florida was more equitable prior to the implementation of performance-based funding that after its implementation.

CHAPTER 1
INTRODUCTION

Community colleges remain an integral part of higher education. There were 1300 public two-year institutions described as community, technical, or two-year branch colleges in 1995 (Vaughan, 1995). These 1300 public institutions served over 5.7 million students including 50% of all first-time college students and 45% of all minority students (Vaughan, 1995). By reaching such masses of people, community colleges were the only system in higher education that embodied the philosophy of Thomas Jefferson, namely, that education be accessible to large segments of people making them productive citizens (Boone, 1997; Vaughan, 1995; Witt, Wattenbarger, Gollattscheck, & Suppiger, 1994). Community colleges equipped a vast number of students with applied skills and academic learning that were essential to maintaining careers or obtaining a job (Carnevale & Desrochers, 1997) or transferring to universities (Grubb, 1996).

Community colleges, labeled as "peoples' colleges" (Boone, 1997), were deeply rooted in communities through mission statements. Programs offered were comprehensive and included transfer programs, skilled training, workforce preparedness, cultural enrichment, and life-long learning (Boone, 1997; Vaughan, 1995). These programs were costly requiring colleges to be prudent in fiscal management. However, no matter how prudent, if resources were not available, colleges would have financial problems. Since the beginning of the 1990s, colleges across the nation competed for declining state resources,

thereby doing more with fewer dollars (Campbell, Leverty, & Sayles, 1996; Leslie & Fretwell, 1996; Vaughan, 1995). A number of factors contributed to the decline in funding (Campbell et al., 1996; Leslie & Fretwell, 1996; Honeyman & Bruhn, 1996; Waggaman, 1991). The economic recession in the early part of the 1990s resulted in fewer tax dollars for general revenue to the states. Mistrust in education by the public and state legislators resulted in declining state support for higher education. Competition for state revenues by other public agencies, such as health care and law enforcement, reduced state and federal revenues allocated to education. (Alfred, 1996; Honeyman & Bruhn, 1996; Leslie & Fretwell, 1996; St. John, 1994). Decline in funding along with rising costs in education (need for technology and increase in administrative staff) and fluctuating student enrollment gave more challenges to financial stability (Honeyman & Bruhn, 1996; Waggaman, 1991).

Funding for public higher education came from federal, state, and local sources, tuition and fees, grants and gifts, and sales and services (Honeyman & Bruhn, 1996). During the expansion years of higher education, between 1950 and 1970, over 90% of the state appropriations came from state tax revenues (Wallace, 1993). By the early 1980s, however, education was no longer deemed a top priority in funding. Education placed 21st among 25 governmental agencies resulting in a decrease in state support for higher education (Wallace, 1993). From 1978 to 1991, state support decreased 7.8% (Wallace, 1993). Federal funding for higher education fared no better. The federal government provided 15% of higher education revenues in 1980 but 12% in 1993 (Finn & Manno, 1996; Honeyman & Bruhn, 1996). Meanwhile, tuition and fees increased from 8.4% in the early 1980s to 10% in 1991 (Wallace, 1993). By 1993, 40% of all revenues for higher

education came from federal, state, and local sources and 26.5% came from tuition and fees (Honeyman & Bruhn, 1996). In California, state funding for higher education decreased 18.1% from the year 1990 to 1995 while Minnesota's and Florida's state funding decreased 13.6% (University of Pennsylvania, 1996)

As part of the higher education system, community colleges also had decreases in funding. In 1988, 74% of community college funding was appropriated from federal, state, and local sources while 22% was from tuition and fees (Honeyman, Williamson, & Wattenbarger, 1991). However, by the early part of the 1990s, 69% of the funding came from federal, state, and local sources while 20% came from tuition and fees (Cohen & Brawer, 1996).

Community colleges received the largest amount of funding from the state. On the national average, 50% of funding came from the state, 21% from local government, 4% from the federal government, and 20% from tuition and fees (Vaughan, 1995). The amount from local government varied from state to state with some states receiving no funding from local sources, such as Alabama, Georgia, and Indiana (Honeyman et al., 1991), whereas Arizona, Kansas, Oregon, and Wisconsin received funding from local sources (Honeyman et al., 1991; Vaughan, 1995).

Since the 1960s, states legislators sought ways to adequately support higher education and equitably distribute state revenues to higher education institutions. The quest for an equitable and yet adequate amount of funding was a result of the remarkable increase of interest in education in late 1940s and 1950s as a result of the G. I. Bill (Boone, 1997; Vaughan, 1995). The spurt of interest in education culminated in large enrollments at universities, colleges, and technical colleges demanding a variety of

programs to meet the needs of the diverse population (McKeown, 1996). Thus, no two colleges were alike when considering enrollment, programs offered, and the broadening of the scope and mission of the college. As a result, funding methodologies became complicated. The first objective of state funding was to provide adequate support to meet the basic operating costs of colleges (Harrell, 1992; Millett, 1974a). The second objective was to achieve equity or "fairness" in the way state resources were distributed to each institution in the system (Harrell, 1992; Millett, 1974a). Millett (1974a) stated that "unless state budgeting meets these two objectives, it has failed to accomplish its purpose" (p. 86). The question that perplexed many state legislatures was how to meet the basic operating costs of the colleges and, at the same time, maintain equity in the distribution of funds.

As state legislators sought "how to adequately support" and "equitably distribute funds," different funding programs, or models, appeared across the states. Of these different funding programs, funding formulas were the most popular. A formula was defined as a group of mathematical statements that tied state appropriations to institutional characteristics (Brinkman, 1988). California, Indiana, Oklahoma, and Texas were the first states to use formula funding in the 1950s (Brinkman, 1988). In 1982, 26 states reported using formulas (Brinkman, 1988). By the year 1996, 30 states reported the use of formulas (McKeown, 1996).

Funding formulas were developed by state governing bodies to, primarily, provide an equitable and, secondarily, an adequate distribution of state funds to colleges within the system (Brinkman, 1988; Floyd, 1982; Layzell & Lyddon, 1990; McKeown, 1989, 1996; Miller, 1964). The use of funding formulas varied from state to state (Brinkman, 1988;

McKeown, 1986, 1989, 1996). Some states used formulas to allocate funds. Other states used formulas to request funds in the budgeting stage. Finally, some states used formulas both to allocate and request funds (Brinkman, 1988; McKeown, 1986, 1989, 1996). No matter what the reason, the use of formulas was sought for its systematic method of dealing with diverse institutions serving diverse populations. Using formulas reduced political competition between institutions, increased communication in the budgeting and allocation process, and minimized conflict between coordinating bodies and institutions (Floyd, 1982; McKeown, 1986, 1989, 1996; Millet, 1974b).

Formulas varied from state to state; changed yearly in any given state; and, were often adopted from state to state and refined to meet different allocation needs. Over the years, the formulas changed depending on the demographics and economic condition of the states, bureaucratic decision making processes, and the specific needs of the institutions such as changing enrollment, mission, and programs (McKeown, 1996; Brinkman, 1988).

Equity, as noted earlier, was the "fairness" in the way state resources were distributed to each institution (Millet, 1974a). The objective of equity was "to provide state appropriations to each of the campuses according to its needs" (McKeown, 1996, p. 53; Millet, 1974b, p. 6). The question that arose was how to determine if funding formulas were equitable in the distribution of states' revenue to the individual institutions? This question was first addressed in the 1960s for primary and secondary public education. Researchers responded to the question by developing a number of statistical measures that determined the degree of equity for funding programs (Thompson, Wood, & Honeyman, 1994). Researchers used the statistical measures to examine the degree of equity on

funding programs for public school education in individual states or groups of states. The results of the research were often used in court cases to ensure equity in public school education (Camp & Thompson, 1988; Thompson et al., 1994; Wood & Thompson, 1996). As a consequence, the concept of equity was a major issue in public school finance during the 1970s (Wood & Thompson, 1996).

The concept of equity came to the attention of a few higher education researchers in the 1980s because of a number of problems confronting higher education at the same time. Enrollment increases resulted in additional costs to the colleges in form of new programs, personnel, and technology advancement (Honeyman & Bruhn, 1996; Waggaman, 1991). The cost of continuing traditional programs increased along with personnel costs and capital outlay needs (Honeyman & Bruhn, 1996; Waggaman, 1991). There was a decrease in eligible revenue because competition for state dollars by other public agencies (Alfred, 1996; Honeyman & Bruhn, 1996; Leslie & Fretwell, 1996). As resources became tighter and institutions were competing against one another for declining dollars, the need to examine how these dollars were distributed became greater (Campbell et al., 1996; Leslie & Fretwell, 1996; Vaughan, 1995).

Community colleges had different revenue needs. With mission statements tied closely to the needs of the community, vocational programs required expensive technology and equipment in the classroom (Leslie & Fretwell, 1996). Along with the recession of the early 1990s came an increase in the enrollment of nontraditional students (Campbell et al., 1996; Vaughan, 1995). This increase of nontraditional students resulted in the need for more student services and programs that involved remediation to prepare students for the rigors of college courses (Campbell et al., 1996; Leslie & Fretwell, 1996).

During the late 1980s and early 1990s, a number of states examined alternate methods for distributing funds to community colleges. Mistrust in education grew because of low scores on standardized tests and an increase demand for remediation (Campbell et al., 1996, Leslie & Fretwell, 1996). At the same time, there was a decrease in federal aid and other public agencies such as health care and law enforcement began to compete for more state funding. Because of declining resources, increased competition for state resources by other public agencies, and mistrust by the public and legislators, many state legislatures implemented performance-based funding tying revenue to productivity (Campbell et al., 1996; Ewell, 1994a; Lombardi & Cepaldi, 1996; McKeown, 1996). As such, appropriations within a funding program were partially or thoroughly allocated according to certain measurable outcomes such as the number of students receiving a degree (Campbell et al., 1996).

Although performance-based funding became popular in the early 1990s, the concept was not new. Tennessee experimented with it in 1974 in addition to its traditional funding method (Serban, 1997). In 1979, Tennessee became the first state to base part of its funding for higher education on performance-based criteria (Banta, Rudolph, Van Dyke, & Fisher, 1996). Performance-based funding did not replace formula funding. Rather, an allocation of additional funds was earmarked (Bogue & Saunders, 1992). Each institution developed performance goals according to the mission statement. When the institution met the prescribed goals, the college received financial award (Floyd, 1982; Meisinger, 1994). Performance-based funding allocation grew from 2% of the total operating budget in 1979 for five performance indicators (Ewell, 1994b) to 5.5% for ten performance indicators by the year 1990 (Meisinger, 1994; Bogue & Saunders, 1992).

The community college system in Tennessee faired well through Tennessee's use of performance-based funding. The 14 community colleges received approximately $100 million in additional revenue as a result of the performance-based funding policy (Mayes, 1995).

Since Tennessee's experiment with performance-based funding, a number of other states followed suit. By 1994, eight of the ten states that had performance-based funding adopted policies in the 1990s (Serban, 1997). Another 18 states were recognized as "likely to adopt" the popular funding method. The amount of revenue allocated to the funding model for performance and the number of indicators were different from state to state. For example, Florida allocated 2.7% of its Community College Program Fund to three performance-based measures for the school year 1997-98, (Florida State Legislature, 1997). South Carolina, for the school year 1998-99, distributed 100% of the higher education budget to technical colleges according to the college's results on 37 measurable outcomes (South Carolina General Assembly, 1996).

Prior to performance-based funding, the more traditional methods of funding, including formulas, were enrollment driven. An institution received revenue from the state according to the number of students enrolled in the college. Data on enrollment numbers were easily collected. As distrust for public education grew, legislators wondered how many of the enrolled students actually finished programs. Performance-based funding linked tax dollars to institutional results, such as the number of students finishing a program, and was not enrollment driven. As a result, data collection and the need for technology became issues (Christal, 1998).

Although performance-based funding sounded great in theory, there were additional problems in practice. The cost of developing a tracking system and adding new personnel to collect and manage data was an additional strain on finances (Campbell et al., 1996). Selection of performance indicators was time consuming for legislators, state governing boards, and representatives from the colleges requiring “collaboration, patience, and persistence seldom found in political decision making” (Burke & Serban, 1997, p. 29).

As for advantages, a number of proponents stated that accountability made colleges more effective and productive (Burke & Serban, 1997). Colleges were forced to examine mission statements, and in doing so, identify and prioritize goals and objectives. The additional percentage of money allocated did not “distract from the base budget” and was used “to enhance existing programs or start new ones” (Serban, 1997, p. 27).

Funding models for community colleges changed over the years evolving to formulas including or being replaced by performance-based funding. However, the concept of “equitably distributing state funds” and “adequately supporting institutions” remained important in community college finance with legislators, coordinating governing bodies for community colleges, and the individual institutions. As community colleges rapidly grew over the years in enrollment and programs, the community college system became a distinctive and significant branch of higher education. With the community colleges’ comprehensive mission to serve the community with vocational and academic programs, the colleges were often the only link between the community and the university. The growth, increase in programs, and significance to the state, however, came with a price. The operating budgets of community colleges across the nation totaled over $18 billion for the year 1995 (Campbell et al., 1996). Considering the significance of the

community colleges, the objectives of a funding program, and the amount of money needed for operating costs of community colleges, it would be to the best interest of all concerned to examine how equitably these billions of dollars were being distributed. After all, too much funding could make institutions inefficient even though the level of funding supported high quality programs. On the other hand, too little funding can negatively impact the educational process (Chambers, 1996) and therefore, the well being of the nation. As formulas changed to include performance-based incentives, it was important to examine how these changes affected the equity objective of the funding program.

Statement of the Problem

As of the late 1990s, there was no perfect state funding method appropriate to all states. The most popular method was the use of funding formulas until the 1990s, at which time performance-based funding became popular. Although funding formulas were different from state to state, they had one thing in common. The intent of a funding formula was to distribute state resources equitably and adequately to public institutions (McKeown, 1996). However, the ability of a funding formula to do so has been argued and debated ever since formulas were first used (McKeown, 1996).

Statistical measures such as the range, federal range ratio, restricted range, coefficient of variation, McLoone index, and Gini coefficient were used in the elementary and secondary funding formula examination of horizontal equity (Berne & Stiefle, 1984; Thompson et al., 1994). Horizontal equity, described as equal treatment of equals, was a principle stating that students who were alike should receive equal shares of funding. Perfect equity was described as every student in the district or system received the same amount of funding. Statistical measurements for horizontal equity assessed how far off the

funding formulas were from perfect equity. Educational researchers, such as Loftus (1983) and Harrell (1992), began examining community colleges funding formulas for horizontal equity using statistical measures developed for public school finance studies in the 1980s. Elementary and secondary funding equity was measured by revenue per pupil or cost of instruction per pupil. Likewise, college funding was described as revenue per pupil or revenue per FTE (full-time equivalent). Using the same ideology for community colleges as the preK-12 system, it was possible to analyze a state's funding formula using the statistical measures as extended by Harrell (1992) for community colleges.

Vertical equity was analyzed for preK-12 funding. The cost of special education, compensatory education, and vocational programs varied from district to district, and therefore, the amount of revenue needed to "assure equality of unequals" (Thompson et al., 1994, p. 178) was greater for some districts than others. A funding methodology that took into consideration student differences increased the degree of vertical equity in a funding program. Usually, pupil weighting or categorical funding was used for vertical adjustments (Thompson et al., 1994). In higher education differentiating costs occurred because vocational programs for certificate and associate of science degrees were more costly to an institution than programs that supported associate of arts degrees. Therefore, in higher education, the amount of revenue needed to assure equality of unequals was greater for some institutions than others. Categorical allocations or weighting the different programs were used in higher education finance to offset the cost. Because preK-12 and community colleges were similar in the way revenues were distributed, such as "revenue per student," statistical measures used to analyze the degree of vertical equity in preK-12 education could be applied to higher education.

The problem was that very little research had been reported on examining equity for community college funding methods for a multi-institution system utilizing the established statistical measures for evaluating equity. Also, there was no reported research on equity studies for community college funding methods that included performance. Although Harrell's (1992) research was based on a multi-institution community college system whose distribution of state's funds depended upon a formula, his study was done prior to the implementation of performance-based funding.

Purpose of the Study

The purpose of this study was to extend the concept of fiscal equity in community colleges by testing the effects of statistical measurements prevalent in public school equity studies on a community college funding system. A further purpose was to examine the change in fiscal equity resulting from the implementation of a performance-based funding system on a state-wide multi-institution community college program.

This study utilized data from the distribution of funds to Florida's community college general revenue for the school year 1994-95 and the school year 1996-97. Statistical measures recognized in public school finance were used to estimate changes in horizontal equity on Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding. The following questions were asked:

1. What were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding?

2. What were the effects of performance-based funding on the degree of equity for Florida's funding formula for the 28 community colleges on its first year of implementation?

Overview of Methodology

This study was designed to be nonexperimental using population data. Using the statistical measurements developed for public school equity studies, the researcher analyzed the degree of horizontal equity on revenue per full-time equivalent student (FTE) for the 28 public community colleges in Florida prior to and following the implementation of performance-based funding. The researcher also analyzed the degree of horizontal equity on revenue per FTE with and without performance-based funding for the year in which performance-based funding was implemented.

The Florida State Department of Education, Division of Community Colleges, provided data for the school years 1994-95 and 1996-97 on the 28 public community colleges in the state of Florida. The year 1994-95 was chosen because it was the year prior to implementation of performance-based funding in the state of Florida. School year 1996-97 was chosen because it was the first year that complete data were available to show performance-based allocations for all 28 public community colleges. Data included the funding formula, allocations from the state's General Revenue Fund to the Community College Program Fund (CCPF), lottery proceeds allocated to the community college system, student fees, and actual FTE for each year specified in the study. Total revenue was the sum of the state's General Revenue allocation to the Community College Program Fund, student fees, and lottery proceeds.

Total revenue per FTE was found by dividing total revenue by the full-time equivalent student count (FTE). Total revenue per FTE was used to calculate the range, restricted range, federal range ration, coefficient of variation, Gini coefficient, and McLoone index for each year chosen in the study to analyze the degree of horizontal equity as described by Berne and Stiefel (1984) and Thompson et al. (1994). The Lorenze curve was plotted to represent the Gini coefficient for each year. The calculations were examined, analyzed, and compared.

Limitations and Delimitations of the Study

The population for this study was the 28 community colleges in Florida, and the results cannot be generalized to any other state. The study was limited to only those public community colleges in state of Florida. The 28 community colleges in Florida had the "same academic mission, common funding objective, and common funding methodology for all institutions within the community college system" (Harrell, 1992, p.11). The study examined fiscal data for public community colleges only. Neither private colleges nor public universities were considered.

The study was limited to the six disparity measures developed for public school education and limited to theory of horizontal equity. The variable was limited to total revenue per FTE. Questions of adequate funding and the concept of vertical equity were not addressed.

Significance of the Study

Considering the fact that community colleges had a total national budget greater than $18 billion as was the case in 1995 (Campbell et al., 1996), one would expect state legislators to be concerned with how resources were distributed to colleges within the

state. Was there "fairness" in the distribution of funds? If not, how could the formula be adjusted to ensure horizontal equity? And, if adjustments were made, were the adjustments effective? This study provided a model for analyzing funding equity in a multi-institution community college system. The study was intended to assist researchers with tools for analyzing the degree of equity on funding formulas for higher education, specifically community colleges. Using this study as a model, state legislators could examine the effectiveness of actions taken to ensure the equity objective in the funding formula.

Moreover, this study provided a base for analyzing the degree of equity in performance-based funding for Florida. As more performance measures were introduced to funding allocations and more resources tied to performance indicators, future researchers could ascertain the degree of equity in the funding formula using the results of this study as a base-line.

Overview of the Study

A literature review was conducted to find research on disparity issues concerning public schools and community colleges. The vast amount of research on disparity issues revolved around preK-12 education. Two researchers, Harrell from University of Florida (1992) and Loftus from Illinois State University (1983), focused on horizontal equity for community colleges. Their research along with similarities in preK-12 studies provided the model for this study in the use of disparity measurements as described by Berne and Stiefel (1984) and Thompson et al. (1994).

The research design was nonexperimental using population data provided by Florida's Department of Education, Division of Community Colleges. Raw data included

student fees, lottery proceeds, general revenue funds, and actual FTE (full-time equivalent student count) for each of the 28 community colleges for the two years specified. Using disparity measurements as noted in Harrell's (1992) community college study and those for preK-12 education, the degree of equity was calculated for each funding formula in the years specified. The calculations were examined and analyzed.

Organization of the Study

This dissertation has five chapters. The first chapter is the introduction. The second chapter contains the literature review including the concept and principles of equity and how the degree of equity was determined. Chapter 2 includes research on formula and performance-based funding, community college funding methodologies, and the funding methodology for the state of Florida for the school years 1994-95 and 1996-97. Chapter 3 contains the research methodology. Chapter 4 contains the analysis of the data. Chapter 5 contains the conclusions of the study. The appendix with raw data follows Chapter 5.

CHAPTER 2
LITERATURE REVIEW

Introduction

Chapter 2 contains the literature search for the study. The principle of equity was explored in preK-12 education along with the statistical measurements used to analyze the degree of equity in a funding program. Studies were examined to identify what principles of equity were considered, how these principles were measured, and what variables were used in the assessment. This study combined the same principles and statistical measurements in a community college setting.

Considering community colleges, the researcher examined different funding methodologies including the most popular, formula funding, and the newest concept, performance-based funding. How community colleges were funded across the nation was discussed in this chapter as well as the funding program and allocation of revenues for the state of Florida.

The Concept of Equity in Public Schools

The concept of equitable treatment known in education finance today was one that evolved over time from the first philosophical writings in western Europe to philosophical and scholarly writers, such as Rawls and Hayek. Hayek insisted that the government allow all seekers of funding to have an equal chance in the pursuit of funding and that the government would not give more goods or benefits to one seeker to the detriment of another (Hayek, 1976). On the other hand, Rawls insisted that there were those who were

more disadvantaged than others, and in this case, the unequal distribution of goods was justified in order to compensate the least advantaged (Rawls, 1977).

Ellwood Cubberley was credited for advancing the concept of equity to public school finance with his writings in the early part of the 1900s (Alexander, 1982; Kearney & Chen, 1989, Thompson et al., 1994; Wood & Thompson, 1996). Believing that all children were equally important and that relying on only local taxes for funding could not guarantee an equitable education, Cubberley recommended that states use resources from general funds to support school districts (Cubberley, 1906). Cubberley's writings moved education in the direction of equal opportunity for all children and made public school education a responsibility of the state (Thompson et al., 1994).

Other theorists and scholars, such as Updegraff, Strayer and Haig, and Mort contributed to the concept of equity in public school finance (Alexander, 1982; Thompson et al., 1994; Wood & Thompson, 1996). Updegraff, in the early 1920s, agreed with Cubberley's belief that the state was responsible for public school education. Furthermore, Updegraff proposed that the state's fiscal responsibility could vary from district to district depending on the local wealth of the district (Updegraff, 1922).

Strayer and Haig contributed to the concept of equity by adding to Cubberley's beliefs. Strayer and Haig stated that schools across a state must have a uniformly prescribed minimum level of education and that public school fiscal administration should be the responsibility of the state education department (Strayer & Haig, 1923). This minimum foundation belief was considered very "revolutionary because it called for equality of students and taxpayers in educational program and tax effort in the belief that

equality of educational opportunity would arise from these requirements" (Thompson et al., 1994, p. 213).

Paul Mort furthered the concept of educational opportunity with his dissertation in 1924 by stating that each child in the state should be offered the same educational package. Mort also introduced the concept of weighted pupil in the state funding mechanism for the cost of specialized programs (Mort, 1924). Mort's beliefs resulted in equal access for students and vertical equity criterion for education finance (Thompson et al., 1994).

As states took on more responsibility in the fiscal management of public school finance, legislatures began to earnestly develop state funding mechanisms that increased the amount of revenue for school districts in order to provide a uniform educational minimum foundation across the state (Thompson et al., 1994). As a result, a number of public school finance equity issues arose. One issue was how well the funding mechanisms were in distributing state funds adequately and equitably to school districts. As a result, the courts became involved changing the concept of equity form one that was philosophical or scholarly to one that was legal. Over the years, a number of court cases cemented the concept of equity in public school finance forcing a number of states to improve funding models.

Public school finance litigation occurred because of inequities in revenue distributions among school districts and the inability of the states' legislatures to correct the disparities (Camp & Thompson, 1988). With hopes to improve funding policies, educational reformers looked to the courts seeking judicial rulings on the constitutionality of many funding models and mandates to improve equity within the funding. By 1996, the

highest courts of 31 states ruled on school finance equity issues in which 14 of the states public school funding programs were ruled unconstitutional (Dayton, 1996).

Cases for public school finance were brought to court under three different theories. One theory was the equal protection doctrine under the federal constitution. According to this theory, litigators argued that the state funding formula violated equal protection clause of the federal constitution because "lower funding level in poorer districts results in a deprivation of education to students who reside in these districts" (Underwood, 1994, p. 144). However, litigators who sought reform through the federal government were not very successful as illustrated by San Antonio v. Rodriguez (1973). With San Antonio v. Rodgriuez (1973), the United States Supreme Court upheld the constitutionality of the Texas public school finance system despite large disparities in funding distributions. As a result, litigators focused their attention on state constitutions.

The other two theories whereby cases on public school finance were brought to court were based on rights mandated under state constitutions. Some litigators applied the equal protection clause under the state constitution. Other litigators argued that the state failed to properly provide an education to the children of the state according to the articles in the state constitution (Underwood, 1994). The successful results of the first state litigation, Serrano v. Priest in 1971 paved the way for other state court cases on public school finance equity through equal protection. The following year, Robinson v. Cahill (1972) opened doors for equity and adequacy by requiring that education be provided in a "thorough and efficient manner" as deemed by the state constitution (Camp & Thompson, 1988, p. 222).

Public school finance litigation was considered important in advancing the concept of equitable distribution of funds to local districts no matter the results of courts (Camp & Thompson, 1988). As noted earlier, funding programs in 14 states were found to be unconstitutional (Dayton, 1996). In anticipation of judiciary acts, a number of other states' funding programs were reformed. Legislators in Illinois made changes to the funding program as a result of a number of court cases being sought across the nation. Likewise, Texas legislators, fearing state litigation after a federal Supreme Court ruling, made drastic changes in the funding model as well as the method used in property appraisal (Camp & Thompson, 1988). As for the actual amount of funding, researchers found that state revenues increased when there was a ruling that education was a fundamental right (Hickrod, Hines, Anthony, Dively, & Pruyne, 1992).

Principles of Equity in Public School Finance

The "fairness" in distributing funds was known as equity in school finance (Berne & Stiefel, 1979; Odden, Berne, & Stiefel, 1979). To determine if a funding program was equitable, Berne & Stiefel (1984) encouraged researchers to create a "framework" that described precisely what researchers intended to assess. This framework was "widely accepted and utilized by many researchers in school finance equity" (Sample & Hartman, 1990, p. 50). The framework was based on four questions (Berne & Stiefel, 1979,1984; Kearney & Chen, 1989; Sample & Hartman, 1990). The first question, a researcher should clarify, was equity for whom? Equity was usually considered for students who received the educational services, although some researchers examined taxpayer equity. The second question sought to identify the resources to be distributed. These resources may be identified as federal and state revenues or as expenditures such as teachers' salaries and

supplies. The third question asked what equity principles were examined in the study. Usually this question implied an examination of vertical equity, horizontal equity, and/or wealth neutrality. The fourth question asked how equity should be measured. In other words, what were the statistical measures used to examine the degree of equity?

Horizontal and vertical equity were integral to the public school finance debate since the 1960s (Berne & Stiefel, 1979; Odden, 1992; Odden et al.,1979; Thompson et al., 1994). Horizontal equity, described as equal treatment of equals, was a principle stating that students who were alike should receive equal shares of funding. Perfect equity was described as every student in the district or system received the same amount of funding. Statistical measurements for horizontal equity assessed how far off the funding formulas were from perfect equity.

Vertical equity, described as unequal treatment of unequals, was a principle stating that children that were not alike should be treated differently. Students with special needs, such as those who were handicapped, who lived in poverty areas, or who spoke English as a second language, were considered to have unequal needs that required different levels of resources. A funding methodology that took into consideration student differences increased the degree of vertical equity in a funding program. One of the most common ways to improve the degree of vertical equity was to allocate funds using pupil weightings (Berne & Stiefel, 1982; Burrup, Brimley, & Garfield, 1993; Odden et al., 1979; Thompson et al., 1994).

The "who" and "what" of Berne and Stiefel's (1984) framework were described through the variable used in the equity assessment. For example, "revenue per pupil" was a variable. In this particular case, "pupil" was considered the unit of analysis and

"revenue" was the object that should be equitable. A number of studies demonstrated different variables used in assessing the degree of horizontal equity in preK-12 education. These studies analyzed disparity of funding formulas across a number of states. Not only did these studies pave the way for reform in preK-12 education, but they also cemented the principles of equity, variables used in the assessment, and statistical measurements used to analyze those principles (Kearney & Chen, 1989; Sample & Hartman, 1990).

One of the most popular variable used in preK-12 equity studies was "revenue per pupil." Revenue was usually defined as the sum of state and local revenues (Alexander, 1997; Cohn & Smith, 1989; Garms, 1979; Hirth, 1994; Jones & Salmon, 1985; Kearney & Chen, 1989; Prince, 1997; Toenjes, 1997; Verstegen, 1987, 1996; Verstegen & Salmon, 1989), although there were variations on this concept. An example of such a variation was "operating revenue per pupil," described as "revenue minus federal funds and monies for capital improvement and debt service" (Hertert, Busch, & Odden, 1994). The other most popular variable was "expenditures per pupil" (Bezeau, 1979; Crampton, 1991; Goertz, 1983; Hickrod, Charudhari, & Lundeen, 1980; Hirth, 1994; Kearney & Chen, 1989; Lake, 1983; Mark & Carruthers, 1982; Oesch & Paquette, 1995; Stiefel, Rubenstein, & Berne, 1998; Wood, Honeymna, & Breyers, 1990).

The unit of analysis was usually "pupil" but this unit was often described in different ways. "Pupil" was described as "pupil average daily attendance (ADA)" (Heinold, 1983; Wood et al.,1990) or "pupil average daily membership (ADM)" (Sample & Hartman, 1990). A few studies focused on pupil weightings (Colton, 1996; Cronk & Johnson, 1983; Johnson & Pillianayagam, 1991; Stark, Wood, & Honeyman 1993; Sample & Hartman, 1990; Verstegen, 1987). Using a weighting scheme in funding was noted as

adding "objectivity and equity" (Burrup et al., 1993, p. 76) to a finance system. Thereby, the use of a weighting scheme was essential for making vertical adjustments when finance officers considered special pupil needs or different program costs (Burrup et al., 1993; Odden et al., 1979; Thompson et al., 1994).

Other researchers combined the principle of weighting to another significant unit of analysis, namely "full-time equivalent." Weighted full-time equivalent (WFTE) was defined in a Florida lottery study as "the summation of the percentages of time a student spends in a particular program multiplied by the weighted cost factor associated with the provisions of services for that program" (Stark et al., 1993, p. 235). Florida's school districts, primarily funded through the Florida Education Finance Program (FEFP), used a funding formula to distribute the state funds based on weighted full-time equivalent (WFTE). Therefore, studies on the equity of the funded formula for the state of Florida used the unit analysis WFTE or FTE (Chambers, 1996; Harrell, 1992; Maiden, 1994; O'Loughlin, 1992; Stark et al., 1993; Summers, 1993, 1996; Summers, Honeyman, Wattenbarger, & Miller, 1995).

Measurement of Equity in Public School Finance

A number of different measures were used to examine the degree of equity in a finance system (Goertz, 1983; Berne & Stiefel, 1984; Thompson et al., 1994). Researchers viewed the degree of equity from a different perspective with each of the different measurements (Berne & Stiefel, 1984; Odden et al., 1979; Thompson et al., 1994). The repeated use of these statistical measures firmly established a "well defined and generally accepted methodology for the measurement of equity" (Cronk & Johnson, 1983, p. 502)

and have "evolved through long political processes and attempts to balance the distribution of scarce resources in every state" (Wood & Thompson, 1996, p.18).

To examine the degree of horizontal equity, the common statistical measures were range, restricted range, federal range ratio, coefficient of variation, McLoone index, and the Gini coefficient (Berne & Stiefel, 1984; Odden, 1979; Thompson et al., 1994; Wood & Thompson, 1996). The Lorenze curve was a graph that was often used to define and explain the Gini coefficient (Bezeau, 1979; Odden, 1992; Thompson et al., 1994).

Range

The range was a general statistical dispersion measure that was applied to education finance (Berne & Stiefel, 1984). The range was defined as the difference between the highest and the lowest per-pupil observation when the distribution was arranged from the lowest to the highest. If the funding distribution had a high degree of equity, then the results of the calculation for the range would show little variation in the distribution. However, the range did not take into consideration the affect of discrepancies occurring as a result of the highest or the lowest observation being an outlying extreme. Examining the range did not identify the discrepancies with other observations in the distribution. The range was also very sensitive to inflation, and many researchers compensated for inflation using the Consumer Price Index to adjust dollars for multiple year studies (Hirth, 1994).

The range was analyzed in a number of studies on per-pupil revenue (Hirth, 1994; Kearney & Chen, 1989; King, 1983; Verstegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). Researchers for school finance also examined the range for per-pupil expenditures (Crampton, 1991; Garris & Cohn, 1996; Hirth, 1994; Kearney & Chen, 1989; Mark &

Carruthers, 1982). The range was also examined on a weighted unit of analysis (Cronk & Johnson, 1983; Johnson & Pillianayagam, 1991; Oesch & Paquette, 1995; Sample & Hartman, 1990; Stark et al., 1993; Stiefel et al., 1998; Verstegen, 1987).

Restricted Range

The restricted range was another general statistical dispersion measure that was applied to education finance. The restricted range took into consideration the middle of the distribution by omitting a given percentage of the pupils at the extremes. The restricted range was defined as the difference between observations at the 95th percentile and the 5th percentile. By examining the data at the percentiles listed, the researcher eliminated the outlying extremes. As with the range, the smaller the number received, the more equitable the distribution. However, the examination of the restricted range did not identify discrepancies with other observations in the distribution and, like the range, many times required adjusting for inflation on multiple year studies (Hirth, 1994).

The restricted range was analyzed in a number of studies on per-pupil revenue (Hirth, 1994; Kearney & Chen, 1989; King, 1983; Verstegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). Researchers for school finance also examined the range for per-pupil expenditures (Garris & Cohn, 1996; Goertz, 1983; Hirth, 1994; Kearney & Chen, 1989; Oesch & Paquette, 1995) and weighted unit of analysis (Cronk & Johnson, 1983; Johnson & Pillianayagam, 1991; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987).

Federal Range Ratio

The federal range ratio was "originally designed as a federal test to measure whether states met federal wealth neutrality guidelines in distributing federal funds"

(Thompson et al., 1994, p. 248). Once known as the "federal measure of disparity" (Hickrod et al., 1980, p.182), the federal range ratio was developed by researchers as a result of the 1974 Impact Aid program. The Impact Aid program allowed states that had funding models designed to equalize revenue distributions by including impact aid funds as local revenue (Hickrod et al., 1980). As a result, the federal range ratio was developed to analyze whether the state's funding model was designed to equalize expenditures (Kearney & Chen, 1989). This measure could be used on both objects of expenditures and revenue. The federal range ratio was defined as the decimal received when the restricted range was divided by the observation at the 5th percentile. It was often converted into a percentage by multiplying by 100. The smaller the decimal calculated for the federal range ratio then the less variation occurring in the distribution, thus making the distribution more equitable. Because the federal range ratio was not sensitive to inflation, it was considered a "more acceptable statistic than range or restricted range" (Hirth, 1994, p. 174).

The federal range ratio was analyzed in a number of studies on per-pupil revenue (Hertert et al., 1994; Hirth, 1994; Jones & Salmon, 1985; Kearney & Chen, 1989; King, 1983; Verstegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). Researchers for school finance also examined the range for per-pupil expenditures (Garris & Cohn, 1996; Goertz, 1983; Hirth, 1994; Kearney & Chen, 1989; Lake, 1983; Oesch & Paquette, 1995) and weighted unit of analysis (Cronk & Johnson, 1983; Johnson & Pillianayagam, 1991; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987).

<u>Coefficient of Variation</u>

The coefficient of variation measured variability in the distribution around the mean observation (King, 1983; Verstegen & Salmon, 1989). The coefficient of variation

was defined as the standard deviation divided by the mean, thereby resulting in a decimal between zero and one. The smaller the decimal value implied less variation in the distribution, thereby indicating more equity in the distribution. Many times the decimal number was multiplied by 100 to indicate the percent of variation in revenue or expenditures for a given proportion of pupils in the state (King, 1983).

The coefficient of variation was analyzed in a number of studies on per-pupil revenue (Heinold, 1983; Hertet et al., 1994; Hirth, 1994; Jones & Salmon, 1985; Kearney & Chen, 1989; King, 1983; Verstegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). Researchers for school finance also examined the range for per-pupil expenditures (Bezeau, 1979; Goertz, 1983; Hirth, 1994; Kearney & Chen, 1989; Lake, 1983; Mark & Carruthers, 1982; Oesch & Paquette, 1995; Stiefel et al., 1998). Other researchers analyzed the coefficient of variation on weighted unit of analysis (Cronk & Johnson, 1983; Johnson & Pillianayagam, 1991; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987).

McLoone Index

The McLoone index, designed by Eugene McLoone in the 1960s (Hickrod et al., 1980), was the first measure developed solely for school finance around a belief that the state should be concerned with those districts whose expenditures or revenues fell below the median. According to McLoone and other finance researchers, it was the state's responsibility for "bringing up the low spending districts" (Hickrod et al., 1980, p. 182). Thus, the McLoone index was designed to examine the bottom half of the distribution showing disparity below the median. The index rose higher as fewer dollars were needed to raise all observations below the median level to the median. In many of the studies on

public school finance, the McLoone index was defined as the ratio of the sum of all expenditures below the median to the sum expenditures below the median when brought up to the median level (Garris & Cohn, 1996; Hickrod et al., 1980; Hirth, 1994; Kearney & Chen, 1989; Oesch & Paquette, 1995; Wood et al., 1990).

Researchers examined the McLoone index for per-pupil revenue (Hertert et al., 1994; Hirth, 1994; Prince, 1997; Kearney & Chen, 1989; Verstegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). Researchers also examined the McLoone index using a weighted unit of analysis (Johnson & Pillianayagam, 1991; Kearney & Chen, 1989; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987).

Gini Coefficient and Lorenze Curve

The Gini coefficient showed how far the distribution was from providing each percentage of students with equal percentages of revenues (Odden et al., 1979; Kearney & Chen, 1989; Thompson et al., 1994). Economists originally used the Gini coefficient for measuring income equality. In the 1970s, researchers lead by Hickrod in school finance used the Gini coefficient to measure wealth neutrality (Lows, 1984; Thompson et al., 1994). Wealth was defined as the ability of a school district to support the school with local property and/or income taxes (Thompson et al., 1994; Wood & Thompson, 1996). Wealth neutrality was the relationship between the measured school district's wealth and the expenditures of the school district (Hickrod et al., 1980). The funding program was considered "wealth neutral" if there was little relationship between the local district wealth and the local district expenditures. The Gini coefficient depicted this relationship through a value calculated from a ratio. For this particular measurement, the number obtained was

between zero and one. The smaller the value of the Gini coefficient then the more equitable the distribution of revenue or expenditures.

The Gini coefficient was best depicted and explained by a graph called the Lorenze curve (Bezeau, 1979; Odden, 1992; Thompson et al., 1994). The Lorenze curve was a graph formed by plotting the cumulative percentage of enrollments against the cumulative percentage of revenues or expenditures. A 45-degree line represented perfect equity denoting that a certain percentage of the students received an equivalent percentage of revenue or used an equivalent percentage of expenditures. The Gini coefficient was the number obtained by calculating the ratio of the total area under the perfect equity line to the area under the curve.

The Gini coefficient, because it was considered a wealth neutrality test, was most frequently used by researchers to show the degree of equity on per-pupil expenditures (Bezeau, 1979; Brown, Ginsburg, Killalea, Rosthal, & Tron, 1978; Cronk & Johnson, 1983; Garris & Cohn, 1996; Hirth, 1994; Kearney & Chen, 1989; Mark & Carruthers, 1982; Oesch & Paquette, 1995; Wood et al., 1990). However, from the 1970s through the 1990s, school finance researchers used the Gini coefficient and Lorenze curve to measure the degree of equity on per-pupil revenue (Hirth, 1994; Jones & Salmon, 1985; Kearney & Chen, 1989; Prince, 1997; Vertsegen, 1994, 1996; Verstegen & Salmon, 1989, 1991). School finance researchers also used the Gini coefficient on weighted units of analysis (Johnson & Pillianayagam, 1991; Kearney & Chen, 1989; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987).

To measure the degree of vertical equity, the pupils were weighted according to the differentiating costs of programs. The horizontal dispersion measurements were then used on the weighted unit of analysis (Berne & Stiefel, 1984; Thompson et al, 1994).

A number of studies illustrated the use of horizontal dispersion measures in public school education. In many studies the range, restricted range, federal range ratio, coefficient of variation, McLoone index, and Gini coefficient were used to assess the degree of horizontal equity (Cronk & Johnson, 1983; Garris & Cohn, 1996; Hirth, 1994; Johnson & Pillianayagam, 1991; Kearney & Chen, 1989; Oesch & Paquette, 1995; Sample & Hartman, 1990; Stark et al., 1993; Verstegen, 1987, 1994, 1996; Verstegen & Salmon, 1989, 1991). In other studies different combinations of the six statistics were used. Of 27 equity studies examined, 17 used the range, 16 used restricted range, 21 used the Gini coefficient, 22 used federal range ratio, 22 used McLoone index, and 23 used coefficient of variation. Three of the studies included the Lorenze curve that depicted the Gini coefficient (Lake, 1983; Bezeau, 1979; Wood et al., 1990). Three studies included the dispersion measurements in calculating the degree of vertical equity on weighted units of analysis (Garms, 1979; Kearney & Chen, 1989; Verstegen, 1987).

Concept of Equity in Higher Education and Community College Finance

The need for equity in postsecondary education has been deliberated by legislators, governing bodies, and community college finance leaders for many years (McKeown, 1996). Equity in the distribution of funds was much more plausible in elementary and secondary education. In public schools, education was free and compulsory, and the educational programs were similar in all local districts (Folger, 1977; Nelson, 1982). Being locally supported, public school districts varied in wealth establishing a need for

state support to equalize revenues to ensure equal opportunity. Whereas in higher education, attendance was not compulsory, and educational programs varied widely across the state. Contrary to public schools, universities did not receive local support and many state community college systems, such as Florida and Massachusetts, received no funding from local resources (Campbell et al., 1996), thus state revenue was not needed to equalize the wealth of districts.

However, higher education had many similarities to public schools, allowing the concept of equity to carry over from public school finance to higher education finance. Revenue for public schools was a combination of state and local resources whereby local resources varied from district to district. For public schools, wealth was described as local resources. Revenue for higher education was a combination of state resources and tuition and fees whereby tuition and fees varied from college to college depending on enrollment. For higher education, wealth could be defined as the combination of state resources and tuition and fees (Harrell, 1992). The question was how to equitably support the financial needs of the institution with decreasing enrollment that resulted in decreasing revenue (Folger, 1977).

Like public schools, equity was one of the objectives originally sought in funding higher education (Hale & Rawson, 1976; Layzell & Lyddon, 1990; McKeown, 1996; Millett, 1974a; Noe, 1986; Wattenbarger, 1991; Wattenbarger & Mercer, 1988). Researchers and scholars of higher education finance agreed that the objective of equity was to distribute state revenues to institutions according to needs. Because colleges differed among themselves in terms of programs, clients, location, mission, and enrollment size, colleges had different funding needs (McKeown, 1996; Millet, 1974a). For many

states, the answer to an equitable distribution was a funding formula that took into consideration the differences in colleges. Funding formulas for colleges were enrollment driven meaning that the amount of money allocated was based on students, credit hours, and faculty numbers (McKeown, 1996).

Principles of Equity in Higher Education and Community College Finance

In the public school system, perfect equity was interpreted as providing the same resources to each school for each student. Likewise, in the community college setting, perfect horizontal equity was defined as providing the same resources to each institution for each full time equivalent student enrolled in comparable programs or courses (Layzell & Lyddon, 1990; Millet, 1974a; McKeown, 1996).

Vertical equity in community college finance was based upon the difference in funding associated with the vocational programs for certificate and associate of science degree (A.S.) in relation to programs that support associate of arts degrees (A.A.). Much like the preK-12 system where public schools needed more funding to offset the additional expenses required for special education and compensatory education, in community college finance, funding needs to offset the additional expense in certificate and A.S. degree programs were greater than funding needs for A.A. degree programs.

Although there was an abundance of public school education research in finance, there was very little research in higher education related to finance. For example, of all the articles submitted to Educational Resources Information Center (ERIC), only 6.5% of the literature was related to higher education finance in year 1996 (Educational Resources Information Center, 1998). Writers for higher education finance articles, reports, and studies submitted to ERIC considered the role the federal government had in funding,

controlling costs, tuition, changing patterns in fund raising, managing endowments, and international comparisons (Educational Resources Information Center, 1996).

Researchers who did studies or papers on higher education finance used the unit of analysis "student" defined as "full-time equivalent student" (Augenblick, 1978; Harrell, 1992; Higham, 1997; Summers, 1993, 1996; Summers et al., 1995). In most cases the object being measured was "revenue" received from the state's general revenue fund that was equal to the expenditures of the college.

Five studies in higher education finance were found, and four studies were focused on community colleges. The unit of analysis for the four studies was "full-time equivalent student" (Harrell, 1992; Loftus, 1983; Summers, 1993, 1996; Summers et al.,1995; Watkins, 1998) and the object was "instructional costs" (Watkins, 1998) or revenue (Harrell, 1992; Loftus, 1983; Summers et al., 1995). Only two of the studies analyzed the degree of horizontal equity for a state's community college funding model (Harrell, 1992; Loftus, 1983) extending the preK-12 dispersion measurements to higher education. The public school equity measures used were range, restricted range, federal range ratio, coefficient of variation, McLoone index, and the Gini coefficient depicted by the Lorenze curve in one of the studies (Harrell, 1992). In the other study coefficient of variation, McLoone index, and Gini coefficient with the Lorenze curve was used (Loftus, 1983). The measure of wealth neutrality was approached different in each study. One researcher examined a community college system that had no local support defined wealth as state resources plus tuition and fees (Harrell, 1992). The other researcher examined a community college system that had local support, and therefore, wealth was defined as revenue from local resources (Loftus, 1983).

Community Colleges Sources of Revenues

Community colleges received support from state and local taxes, student fees, and federal programs. Financial resources also came from other sources such as foundations, fund raising, and continuing education. In the early 1990s, community colleges reported receiving 58.2% of the funding from the state, 12.9% from local sources, 21.7% from student tuition and fees, 2.7% from federal programs, and 4.2% in other sources (Honeyman et al., 1991). In 1995, community colleges received approximately 50% from state taxes, 21% from local taxes, 20% from student tuition and fees, 4% from the federal government, and 5% from other sources (Vaughan, 1995).

The use of local taxes to support community colleges was rooted in the colleges' conception, and the amount of local support varied from state to state (Campbell et al., 1996; Cohen & Brawer, 1989; Honeyman et al., 1991; Witt et al., 1994). Many community colleges, once extensions of K-12 systems, continued to receive local revenue despite the break from the K-12 systems. In other cases, communities that did not have local colleges agreed to develop and financially support community colleges (Wattenbarger & Cage, 1974; Witt et al, 1994). Finally, a number of community colleges received no financial support locally. In 1991, nineteen states and Puerto Rico reported no local support for community colleges (Honeyman et al., 1991).

Federal government support for community colleges was directly related to financial aid and programs for special populations (Campbell et al., 1996). Federal support made up 2% of community college income in 1942 and grew to 10% by 1986 (Cohen & Brawer, 1989). Since then, federal aid has decreased to approximately 4% or 5% (Honeyman et al., 1991; Vaughan, 1995), with the National Center for Education

Statistics reporting 5.5% federal support for fiscal year 1995 (Barbett & Korb, 1997, p. 8).

Student tuition and fees were a controversial issue for community colleges for a number of years. Many community college leaders advocated no tuition or minimal tuition because of the historical factor connecting community college to preK-12 education (Cohen & Brawer, 1989). The issue changed over the years from one of no-tuition to a debate on how much of the educational cost should be sustained by the student. Tuition and fees supported 11% community college revenue in 1942, a share that grew to 16% by 1986 (Cohen & Brawer, 1989) and grew to 20-22% of community college revenue early to mid 1990s (Honeyman et al., 1991; Vaughan, 1995). By fiscal year 1995, 21.2% of revenue came from student tuition and fees, according to the National Center for Education Statistics (Barbett & Korb, 1997, p. 8).

According to at the National Center of Education Statistics (1999), the average undergraduate tuition and fees in 1996 constant dollars increased 23.2% between years 1990 to 1995. In order to curb tuition increases by institutions, many states regulated increases on tuition rates and the amount that tuition rates could be raised (Campbell et al., 1996). On the other hand, the pressure to increase tuition and fees often came from state legislators who were seeking ways to cut state budgets (Cohen & Brawer, 1989). The rationale for increasing tuition was the thought that those benefiting from education most should pay for it. However, this was contrary to the belief that an educated person benefited society and, therefore, tuition should be low to improve the nation's citizenry (Vaughan, 1995). In order to improve economically as a nation, people with low incomes needed education to obtain higher skilled and better paying jobs (Vaughan, 1995).

However, raising tuition rates penalized people with low incomes more so than those in higher income brackets (Cohen & Brawer, 1989; Honeyman & Bruhn, 1996; Geske, 1996). Not only did raising tuition penalize low-income people, it also threatened the open door policy of community colleges by restricting the accessibility of the institutions by lower-income families (Campbell et al., 1996).

Community colleges' greatest financial support came from the state (Campbell et al., 1996; Cohen & Brawer, 1989; Honeyman et al., 1991; Vaughan, 1995). Although some of the state support was in the form of financial aid to students, most financial resources for community colleges were dollars received from the state's general revenue. Community colleges' income from state support increased from 28% to 47% between the years 1942 and 1986 (Cohen & Brawer, 1989) to 58.2% in 1990 (Honeyman et al., 1991). For fiscal year 1995, the level of support to community colleges from the state was reported as 40.8%, according to the National Center for Education Statistics (Barbett & Korb, 1997, p. 8). A number of community college systems, as in the states of Florida and Massachusetts, were "wholly state funded" (Campbell et al., 1996, p. 176), meaning that the primary source of income was from the state, with no local support.

Across the nation, lottery became a popular mechanism for supporting public education. Nearly 40% of the states used lottery proceeds to support community colleges at the beginning of the 1990s (Honeyman et al., 1991). Thirty-five states and the District of Columbia reported having a state lottery in 1993 (Summers, 1996). Even though it was proven that state funds used to support community colleges declined over the years after the lottery was first introduced (Summers, 1993; Summers et al., 1995), states continued to used lottery proceeds to enhance revenue.

Community College Funding Methodologies

Not only did funding programs vary from state to state, but each funding package was influenced by political and economic conditions, the geographic location of the college, and the funding history of the college (Cohen & Brawer, 1989; Layzell & Lyddon, 1990; Vaughan, 1995). Although funding programs were developed through state policies and mandates, compromise during legislative sessions changed the funding package. Likewise, economic conditions such as taxpayer cries for relief and economic recessions affected the package. Costly programs needed in different geographical locations to serve the community also affected funding needs.

Despite all the differences in funding programs, most of the programs were patterned after four finance models described by Wattenbarger and Starnes (1986): negotiated budget funding, minimum foundation funding, cost-based program funding, and unit-rate formulas. In more recent years, performance-based funding became popular (Campbell et al., 1996).

Negotiated budget funding occurred when individual colleges annually negotiate with the state through college representatives. Each college was seen as a separate entity negotiating for its share of the revenues.

Minimum foundation funding was described as a funding program that guaranteed a minimum level of state and local revenues per student. The amount of revenues contributed to the college by the state was the "difference between the amount of local support and the established minimum standard" (Martorana & Wattenbarger, 1988).

Cost-based-program funding with cost-to-continue was a funding program that allocated revenues on the basis of an analysis of actual program costs. Studies were done

across the state to determine actual program costs. From these state-wide studies, amounts were set for program costs and used in allocating state funds.

Unit-rate formulas were funding programs based on a defined unit. This unit was defined as instructional hours, enrollment such as head count or full-time equivalent student, student credit hours, or any other output measurement (Martorana & Wattenbarger, 1988).

Funding Formulas

With the public's increase of interest in higher education in the late 1940s and the 1950s, universities and colleges across the nation experienced a great increase in enrollment demanding a variety of programs to meet the needs of the diverse population (McKeown, 1996; Witt et al., 1994). Thus, no two colleges were alike in mission, enrollment, programs being offered, or the amount of revenue needed to adequately support the basic operating costs of the college or university. As state legislators struggled for new ways to adequately support colleges and universities while equitably distributing funds, funding formulas appeared as a systematic method for doing so. In fact, the equitable distribution of funds was the major factor in developing many of the states funding formulas as in Texas, New Mexico, and Tennessee (Miller, 1964).

A funding formula was defined as "mathematical basis for allocating dollars to institutions of higher education using a set of rates, ratios, and/or percentages derived from cost studies and peer analyses" (McKeown & Layzell, 1994, p. 320). The word "formula" often deceived people outside the realm of education finance because the term itself evoked thoughts of a single equation. In some states, a separate formula was developed for instruction as well as for libraries and capital outlay. In this way, the term

"formula" implied a combination of subformulas or factors (Miller, 1964). People working with formulas in education finance found themselves using the word "formula" in two different ways. The word "formula" was used to denote individual subformulas that applied to specific programs. On the other hand, the word "formula" was also used to describe the group of subformulas used in a state's funding program (Miller, 1964).

Using formulas reduced political competition between institutions, increased communication in the budgeting and allocation process, and minimized conflict between coordinating bodies and institutions (Albright, 1996; Brinkman, 1988; Floyd, 1982; McKeown, 1986, 1989, 1996; Millet, 1974b). By reducing the complexity of the budget and allocation process, formulas helped to minimize conflict between those developing the budget and those receiving the funding by having a routinely agreed upon set of frameworks for discussion (Brinkman, 1988).

On the other hand, there were weaknesses in the use of funding formulas. Formulas were always based upon the past performance of an institution. As a result, formulas became more projective instead of predictive (Brinkman, 1988; Miller, 1964), especially when considering that most formulas were based upon enrollment (McKeown, 1994). What would happen to the college's revenue if there were a sudden decrease in enrollment? Would the college pay money back to the state or would the amount of revenue decrease over time? And what would happen if there was a great increase of enrollment driving up costs and additional staff support? Were state resources readily available or did an institution have to suffer through the year until the next fiscal year? Being based on the past instead of the future, formulas discouraged the development of innovative programs and new technology (Brinkman, 1988).

Although the rationale for funding formulas and the definition remained the same over the years, formulas did not remain the same from year to year. Funding formulas changed each year in relation to the economy, bureaucratic processes, changes in strategic plans and goals of universities or colleges, demographics, and identification of special needs by colleges (Brinkman, 1988; McKeown, 1996; Campbell et al., 1996; Vaughan, 1995). Therefore, funding formulas varied from year to year and from state to state and were often adopted from one state to another and then changed to meet the needs of the adoptive state. As a result, formulas were "tweaked, adjusted, and added to in response to equity, mission focus, and changing priorities" (Albright, 1996, p. 2).

The first reported use of formulas for distributing revenue to universities and colleges dated back to 1951 by the states of California, Indiana, Oklahoma, and Texas (Brinkman, 1988). By 1992, 33 states reported using formulas (McKeown & Layzell, 1994). Of the 33 states reporting the use of funding formulas, 32 states used formulas in making recommendations to the legislature; 16 used formulas for final legislative appropriations; and, 13 used formulas for allocating appropriations. Four years later the number of states reporting the use of formulas dropped to 30 (McKeown, 1996). The number of states using formulas changed as states modified funding programs or as a result of how the person reporting for the state interpreted the concept of "formula" (McKeown, 1996).

The pressure for accountability lead many states to deviate from funding formulas that were enrollment driven to ones that included allocating revenue based on specific performance outcomes chosen by the state. In some cases, as in Florida, performance incentives were part of the formula. In other cases, such as South Carolina, performance-

based funding replaced a previous model. Because formulas were first used to ensure equity in the distribution of funds, the change from formula funding to performance-based funding was a shift "away from equity and adequacy goals toward goals of accountability and efficiency" (McKeown, 1996, p. 61).

Performance-Based Funding

The goals of higher education in 1970s and 1980s were promoting growth and providing equity in the allocation process of funding. Growth in enrollment was promoted through financial aid programs and low tuition to make college more accessible to lower-income families and minorities (Gaither, Nedwek, & Neal, 1994). Equity in the allocation process was promoted by using a funding model, usually a funding formula, that was based on enrollment to guarantee meeting the financial needs of a college.

Although enrollment growth and equity of allocations were objectives in higher education in the 1970s, concern for assessment began to grow in the 1980s. Standardized test scores declined greatly despite the increase in spending, and remedial education in undergraduate programs grew making taxpayers and legislators critical of education (Campbell et al., 1996; Gaither et al., 1994; Leslie & Fretwell, 1996). In 1986, a task force from the National Governors' Association called for every college and university to implement a system for assessing undergraduate student learning (Gaither, 1995; Gaither et al., 1994; New York State Education Department, 1996; Sims, 1992). How to implement the systematic assessment was left to the leadership of the institution (Forgione, 1997). By 1988, 55% of all colleges and universities reported having some form of assessment in progress (Gaither, 1995).

The severe economic recession of the early 1990s with extreme setbacks in state and federal resources had a serious impact on higher education (Leslie & Fretwell, 1996). As other public agencies, such as health and law enforcement, competed for scarce state resources, legislators wondered how to best spend dollars diligently and wisely and began to question cost and productivity in education (Campbell et al., 1996; Ewell, 1994a; Gaither, 1995; Gaither et al., 1994; Leslie & Fretwell, 1996; Neal, 1995). Thus began the "accountability movement" of the 1990s, whereby focus was on external assessment of common and comparable standards across the state (Gaither, 1995; New York State Education Department, 1996c). Accountability was denoted as "the process of evaluating higher education's success in meeting its missions and goals" (Kentucky Council on Higher Education, 1996). The assessment that was voluntary in the late 1980s became mandatory in the 1990s.

Other factors furthered the accountability movement. With a decrease in state and local resources, the responsibility of paying for higher education shifted to parents and students in the form of tuition and fees (Campbell et al., 1996; Leslie & Fretwell, 1996; Ruppert, 1995). Tuition increased rapidly over the years, making taxpayers question the affordability, the need for, and the results of education.

The change in student demographics also furthered the accountability movement. Students changed from being high school graduates taking classes full time in degree programs to nontraditional students being older men and women taking classes part time. Some of these nontraditional students were employed full-time with families and would often have to interrupt their education because of multiple responsibilities (Leslie & Fretwell, 1996). An increase in minority students taking classes full-time and part-time

also occurred. As a result of job termination during the economic recession in the early 1990s, unemployed people went back to college seeking employable skills rather than degrees. These demographic changes resulted in policy makers reflecting on issues of enrollment, retention, and graduation rates for a more diverse population (Ruppert, 1995).

For many policy makers, a "quality institution" was a "productive institution, providing measurable returns for the state's economic aid in the form of research dollars, training, and service" (Gaither et al., 1994, p. 13). Performance measures were developed by the state's legislature or coordinating board to assess an institution's contribution to the goals of the state (Albright, 1996; Ruppert, 1995). By having colleges respond to those measures, it was the desire of the state's legislature and/or coordinating board that education would re-establish its credibility, justify the need for increased funding, and create a vision for the future shared by both legislators and college representatives (Ewell, 1990). The use of performance criteria would also improve undergraduate education by identifying areas in need of improvement and thereby, improve the effectiveness and efficiency of a college (New York State Education Department, 1996; Ruppert, 1995).

Before measures were developed, goals were needed for the higher education system. Goals were selected by either of two methods. Either the higher education community through the coordinating boards developed the goals, or the goals were developed through legislative mandates (Albright, 1996; Ruppert, 1995). Goals most commonly accepted by a state's legislature or coordinating board included the concepts of retention, articulation, graduation, workforce development, program delivery, and student/faculty characteristics (Albright, 1996). Some goals were more important than others to state policy makers and therefore, some states used a weighting scheme to

elaborate the difference. Because of the difference in missions, universities often had a different set of goals than community colleges. In some states, as in Missouri and Kentucky, state goals allowed for flexibility within a system in order to support the differences that existed in the institutions (Albright, 1996).

From the goals, state coordinating bodies or legislators, developed performance measures. Performance measures were used "to gain insight into, and make judgements about, the effectiveness and efficiency " of the programs, processes, faculty/staff, and students (National Performance Review, 1997, p. 4). Performance indicators were then developed to measure higher education's "progress in meeting strategic goals and objectives, gather and analyze performance data, and then use these data to drive improvements" in higher education colleges and universities (National Performance Review, 1997, p. 4). Performance indicators were categorized as educational quality and effectiveness, access-diversity-equity, efficiency and productivity, contributions to state needs, and contributions to other educational sectors (Ruppert, 1995, p18-19).

Educational Quality and Effectiveness

Most of the performance indicators fell into this category. The performance indicators in this category were based on undergraduate teaching and learning. Such indicators included the number of students in remediation, remediation effectiveness, faculty/student ratios, class size, graduation rates, results of licensure exams, job placement rates, degrees or certificates awarded by divisions and disciplines, number of degrees or certificates, and number of accredited programs.

Access-Diversity-Equity

This category represented the efforts made by institutions to accommodate the changing student demographics. Indicators included in this category were the number of diverse faculty, number of students representing diverse populations, graduation rates by ethnicity, and progress in obtaining diverse faculty and student population.

Efficiency and Productivity

This category represented how well the institution made use of faculty, equipment, and buildings. Indicators included in this category were classroom and building utilization, total contact hours of faculty, faculty workload, average faculty salary, faculty/student ratios, number of credits needed to obtain degrees, amount of time needed to complete a degree or certificate, and costs to the student and state.

Contribution to State Needs

This category represented the needs of the state and how well the colleges met these needs. Indicators in this category included workforce development, fulfilling employment needs, economic impact on the state, continuing education, and employer evaluations of the college through surveys.

Contribution to Other Educational Sectors

This category represented how well the colleges related to the educational system as the whole. Indicators in this category included dual enrollment or other ideologies uniting college to public school education, effectiveness of remedial programs, transfer rates from two-year colleges to four-year colleges, performance of transfer students, and articulation agreements. The category also included programs linking two-year colleges to

four-year universities, such as 2 + 2 programs, and programs that connected colleges to businesses.

There were a number of similarities in the use of performance indicators across the nation. One similarity was the use of specific indicators from state to state. Of the 38 states that reported using performance measures whether for assessment purposes or funding allocations, 31 of the states reported using graduation rates as an indicator. Another most frequently used performance indicator was transfer rates with 24 states reporting its usage, and 23 states reported using faculty workload/productivity data (Christal, 1997).

There were a number of differences in the use of performance measures across the states. State language that mandated the use of performance measures was different from state to state (Albright, 1996). State goals ranged from being very narrow, such as Florida with three measures, to a very elaborate, diversified, and wide range of goals as in Colorado (Albright, 1996). The number of measures used was also very different ranging from three, as in Florida, to 37 measures used in South Carolina.

Results on performance indicators were reported to a number of sectors. Reports were disseminated to state legislatures in 34 out of the 48 states. Governor's office received the report in 32 out of 48 states. In 20 states, the report was shared with the statewide system, and in 19 states, the reports were shared with consumers and constituencies (Christal, 1997; Ruppert, 1995). Results on performance indicators were noted to help legislature in all aspects of governing such as in budget decisions, developing state policies and goals, communication with public, and monitoring policy implementation (Minnesota Office of the Legislative Auditor, 1994). Likewise, colleges

and universities were noted to use performance information for selecting goals and strategies (Minnesota Office of the Legislative Auditor, 1994).

The use of performance indicators culminated in comparisons between colleges across the state (Gaither et al., 1994) and the results were often tied to state funding. Performance-based funding tied special sums directly to results of specific indicators whereas performance-based budgeting considered results of performance indicators as a factor in the total funding package (Burke & Serban, 1998a, p. 27). By 1994, ten states adopted performance funding. These 10 states were Colorado, Connecticut, Florida, Kentucky, Minnesota, Missouri, Ohio, South Carolina, Tennessee, and Washington. Alabama, Florida, Hawaii, Idaho, Kansas, Nebraska, Rhode Island, and Texas were eight states that adopted performance-based budgeting in 1994. By 1998, twenty-one states had performance-based budgeting (Burke & Serban, 1998b). According to the results of the survey by the Rockefeller Institute, "more states preferred performance budgeting, with its lose link to budgeting, than performance funding, with its tight tie to funding" (Burke & Serban, 1998b, p. 2). The growth of states using performance-based funding or budgeting showed that "coordinating boards and state officials (were) increasingly accepting the concept that results should count when allocating resources to public colleges and universities" (Burke & Serban, 1998b, p. 2). Considering that 21 states used performance budgeting, 13 states used performance funding, and 8 states used both forms, predications showed that 35 states would use performance criteria in the allocation process, or the budgeting process, or both processes by the year 2003 (Burke & Serban, 1998b).

Most states used performance-based funding/budgeting as an incentive incorporating it into the funding model or in addition to the funding model. Only one state,

South Carolina, used performance-based funding for 100% of its funding allocation. Normally, between one to five percent of the budget supported performance and these funds were usually in the form of incentives (Albright, 1995; Serban, 1997; Christal, 1997).

Because performance-based funding/budgeting was tied to achievement on performance measures, indicators were symbolic of goals by state legislators for higher education (Serban, 1997). Considering colleges across the state had diverse missions making each institution unique, many scholars and state policy makers noted that some indicators were more appropriate than others for measuring an institution's productivity. The most likely appropriate measures for higher education, especially when funding was tied to the measures, were those measures that dealt with retention/graduation rates, job placement, licensure exam results, and employer survey results (Serban, 1997). However, there was a discrepancy depending on who was surveyed as to how indicators were rated. Legislators identified the following order of indicators as most preferred: job placement, preK-12 linkage, licensure exam results, retention/graduation rates, and employer satisfaction survey (Serban, 1997). On the other hand, deans of two-year colleges rated the most preferred indicators as satisfaction surveys of employers, alumni, and students, and licensure exams (Serban, 1997). Understanding that community college students often took classes to improve employment skills and not to obtain degrees, deans of colleges were not impressed with the idea of using retention/graduation rates for funding purposes.

The least appropriate measures for higher education were administrative cost/size, the time it took to obtain a degree, and ethnic/gender diversity (Serban, 1997). Community college leaders believed that the "time to degree" measure contradicted the

open-door policy of the community college and violated the community mission. Community college leaders reasoned that if the goal was to achieve degrees, then a great number of students were left out in the count. Community colleges enrolled students who wanted to update skills and nontraditional students who took college part time to obtain the degree. Therefore, the "time to degree" was least appropriate to community college measurement of productivity (Serban, 1997).

Other scholars and educators claimed that "ethnic/gender diversity" measure was not appropriate to colleges and universities. Those institutions that normally had a large population of minorities in the community would fair better than those whose location did not. In fact, it was hypothesized by many scholars that the "ethnic/gender diversity" measure contributed to the downfall of the performance-based funding proposal in the state of Texas (Burke & Serban, 1997).

Although performance-based funding became popular in the 1990s, the concept was not new. With funding from Kellogg and Ford Foundation and the Fund for the Improvement of Postsecondary Education, statewide studies in Tennessee resulted in a pilot program to determine if funding could be tied to performance criteria instead of enrollment (Banta et al., 1996; Burke & Serban, 1998c). By 1979, Tennessee became the first state to base part of its funding for higher education on performance-based funding (Banta et al., 1996). Performance-based funding did not replace formula funding. Rather, an allocation of additional funds was earmarked (Bogue & Saunders, 1992); each institution developed it's own performance goals according to its mission and the state's performance standards; and, when the institution demonstrated that it met its goals, the college received the financial award (Floyd, 1982; Meisinger, 1994).

The 1979 state performance standards in Tennessee were based on obtaining accreditation for programs, results on standardized exit exams for a graduate's major and general education courses, survey results on the satisfaction of students/graduates/employees with academic programs, and results of program peer reviews. Two percent of state's "instructional component of its education and general budget" (Banta et al., 1996, p. 23) was earned by the college as a supplement.

Performance-based funding allocation in Tennessee grew from 2% of the total instructional budget in 1979 for five performance indicators (Ewell, 1994b) to 5.5% for ten performance indicators by the year 1990 (Banta et al., 1995 Meisinger, 1994; Bogue & Saunders, 1992). In addition to the original five performance standards the following criteria were added: improvement actions taken to remedy identified weaknesses, transfer program reviews or placement in the job market, enrollment goals for campus-specific groups, graduation rates, and mission-specific objectives (Banta et al., 1996, p. 25). Up to ten points were awarded for performance for each indicator. A total of 100 points for the 10 indicators resulted in an additional 5.45% of the institution's state appropriation (Alberta Advanced Education and Career Development, 1997).

The community college system in Tennessee faired well through Tennessee's use of performance-based funding. The 14 community colleges received approximately an additional $100 million as a result of the performance-based funding policy by 1994 (Mayes, 1995).

Since Tennessee's experiment and success with performance-based funding, a number of other states followed suit. Eight of the ten states that reported using performance-based funding in 1994 adopted such policies in 1990s (Burke & Serban, 1997). Colorado and Missouri reported implementation in 1994, Arkansas in 1995, and

Ohio in 1996. The most recent states added to the list of performance-based funding states were Florida and Kentucky in 1996, and, of course South Carolina, with its 100% allocation, in 1998 (Christal, 1997).

Missouri

Missouri began its quest for performance-based funding in 1990 with a statewide task force that established new goals for institutions of higher education (Albright, 1996). By 1993, the state implemented performance-based funding for four-year colleges and the following year, two-year colleges were included in the package. The funding model called for a two-tier plan. The objective of the first tier was to reward institutions that achieved statewide goals. The objective of the second tier was a campus-based initiative that rewarded institutions that "designed and implemented mission-based performance programs designed to stimulate teaching and learning on individual campuses" (Albright, 1997, p. 11). In 1996, one percent of the total state general fund appropriation went to two-year colleges in performance funding while 1.2% of the general fund went to four-year institutions (Engelbach, 1997). Performance indicators under the first tier of the plan for two-year colleges included number of degree/certificates awarded, minority graduates, graduates who passed the licensure exam, transfer students who graduated from four-year degree programs, and students placed in a job (Albright, 1997).

Florida

Assessment was part of Florida's higher educational scheme for a number of years prior to performance-based funding/budgeting. Florida was an initiator of assessment activities beginning in 1979 when the Articulation Coordinating Committee, created by the State Board of Education, developed a list of competencies that were later adopted (Van de Water, 1994). The Standing Committee on Student Achievement after reviewing a

number of commercially available testing packages concluded there was no test appropriate to the list of competencies required by the state. As a result, the College Level Academic Skills Project was formed in 1981 to design and implement a competency-testing program for sophomores in college (Holcombe, 1997). This testing program became known as the CLAST (College Level Academic Skills Test). In 1992, a state implementation committee developed five performance measures whose outcomes were reliable and valid according to database specialists (Tyree & Hellmich, 1995). In 1994, the Performance and Accountability Act legislation linked performance measures to funding for all state agencies (FLA. STAT. ch.216.0166 [Supp. 1994]; FLA. STAT. ch. 216.0172 [Supp. 1994]). According to the state plan, performance-based budgeting for all 28 community colleges began in school year 1996-97, the university system in 1997-98, and the public school district in 1998-99 (Staff of the Committee on Higher Education, 1996).

The performance-based budgeting was an incentive funding plan that was required for all community colleges in Florida. For school year 1996-97, the first year of implementation, performance funds of $12 million were allocated for distribution to the 28 community colleges based on the achievements of specified student outcomes (Conference Committee Report on House Bill 2715 [Fl. 1996]). The colleges earned incentive funds for each student who successfully completed a degree or certificate program. In addition, for each completer who was successfully remediated, economically disadvantaged, disabled, licensed in a profession or placed in a job, colleges received additional state funding (Conference Committee Report on House Bill 2715 [Fl. 1996]).

Colorado

Colorado's performance-based funding was an example of a program that was implemented then suspended while its approach was altered. Colorado implemented a performance-based funding program in 1995 distributing funds to two-year and four-year institutions based upon five policy areas (Alberta Advanced Education and Career Development, 1997; Albright, 1996; Burke & Serban, 1998c; Engelbach, 1997). These five areas included prek-12 linkage, increasing productivity, workforce training, financial aid, and enrollment. However, between 1995 and 1997, the policy areas had changed. For the school year 1995-96, financial aid was replaced with technology and for the school year 1996-97, enrollment was replaced by an undergraduate education focus (Albright, 1996). For the school year 1995-96, 3.4% of the total state general fund was allocated to higher education for performance criteria (Engelbach, 1997). In 1996, Colorado legislature suspended performance-based funding with a mandate that governing boards develop a new set of performance measures/indicators by year 1999 (Burke & Serban, 1998c; Engelbach, 1997). Once these new indicators were established, it was expected that performance-based funding would again be implemented.

Kentucky

Kentucky's performance-based funding model illustrated a plan that included institutional uniqueness. Kentucky's governor in 1993 appointed the Higher Education Review Commission to analyze the higher education system in order to initiate a restructuring (Ruppert, 1994c; Albright, 1996). At the end of the study, the Commission proposed a revised funding model that incorporated performance criteria (Ruppert, 1994c) that was approved by the 1994 legislation (Albright, 1996). The revised program had a

three-year phase in for performance-based funding (Albright, 1996; Kentucky Council on Postsecondary Education, 1996a). The first year included developing the goals and baselines. The second year marked the colleges and universities first year efforts in achieving the goals. The third year showed the results of the colleges and universities improvement from the baseline.

The performance-based funding program for Kentucky focused on only a few indicators and provided for "necessary flexibility to the institutions in implementing institutional missions as well as the systemwide and institutional strategic plans" (Kentucky Council on Postsecondary Education, 1996b). All colleges and universities were measured on four common indicators. For community colleges, the four indicators were quality of educational outcomes, student advancement, use of technology in student learning, and workforce development.

Colleges and universities in Kentucky could also select seven campus-specific indicators and two mission-specific indicators allowing for flexibility between institutions. These indicators were chosen from the following: effective use of resources, global perspective in academic programs, review of gender issues, cooperative academic degree programs, alternative educational delivery, and level of gifts and grants " (Kentucky Council on Postsecondary Education, 1996b; Burke & Serban, 1998c).

Presidents of the colleges and universities in Kentucky assigned the values of points assigned to each indicator whether it was one of the common indicators, requiring between10 to30 points for each indicator, or whether it was an institutional-specific indicator, requiring between five to 15 points for each indicator. The total allowed for the four common indicators had to be at least 50 points while the total allowed for the

institution-specific indicators had to be at most 50 points. The grand total for each institution had to be 100 points. The amount of funding received depended on the number of points earned.

Performance-based funding in Kentucky, however, was short-lived. A new Governor, Patton, changed the funding from results to incentives allowing for up-front revenue (Burke & Serban, 1998c).

Ohio

In 1993, the Board of Regents developed nine service standards for all community and technical colleges in Ohio (Albright, 1996; Engelbach, 1997). The nine service standards included job training, developmental education, transfer to four-year degree granting institutions, business partnerships, preK-12 linkage, low tuition and fees, and community involvement (Burke & Serban, 1998c). Representatives from the two-year institutions later developed the indicators in each of the nine service standards to assess each institution's performance in meeting those standards and tied the indicators to additional funding (Burke & Serban, 1998c; Engelbach, 1997). In 1996, the Board distributed $1.5 million to the two-year institutions based upon performance results. In 1997, the amount allocated to performance doubled to $3 million (Burke & Serban, 1998c; Engelbach, 1997).

South Carolina

South Carolina's performance-based funding model slowly evolved from an assessment endeavor in the early 1980s (Gosnell & McCall, 1998; Ruppert, 1994a) to one of most comprehensive performance funding models by the late 1990s. Although the passing of Educational Improvement Act in 1984 was to reform preK-12 education, it also

encouraged a focus on higher education (Ruppert, 1994b). In 1986, the Commission of Higher Education authorized a study to evaluate higher education in the state of South Carolina. The study culminated in a piece of legislature in 1988 known as the "Cutting Edge" (Ewell, 1994a; Ruppert, 1994b). The objective of the "Cutting Edge" legislation was to improve accountability in higher education and strengthen the quality of education (Ruppert, 1994b). The "Cutting Edge" legislation mandated that colleges across the state submit reports annually on 18 different areas. The colleges reported on students' competency in core requirements and major, results on licensure exams, success in remedial programs, entry level skills, and success in meeting admission requirements. The colleges reported transfer, attrition, and graduation rates as well as academic performance of student athletes. The colleges also reported on a number of minority issues and changes in programs due to external review. The college reported on other areas that included student services, public services, library, facilities, and research. In 1992, legislation passed that mandated the Commission of Higher Education to adopt a state-wide procedure for collecting data (Ruppert, 1994b).

With the passing of South Carolina's Act 359 in May 1996, funding became tied to performance-based measures. For the first year when using performance-based funding, 25% of the state funding was based on 14 indicators. The percentage of funding tied to performance-based measures increased to 75% on 21 indicators for the next school year. One hundred percent of the revenue distribution to higher education was based on 37 performance indicators for year 1999 (McCall & Gosnell, 1998; Albright, 1996). The 37 performance indicators were divided into nine categories used to determine the quality of higher education. These nine categories were mission focus, quality of faculty,

instructional quality, institutional cooperation and collaboration, administrative efficiency, entrance requirements, graduates achievements, user-friendliness of institution, and research funding (Burke & Serban, 1998c; McCall & Gosnell, 1998; Horry-Georgetown Technical College, 1997).

Mission focus. This category included expenditure of funds to achieve institutional mission, curricula offered to achieve mission, approval of mission statement, adoption of strategic plan to support the mission statement, and attainment of goals of the strategic plan.

Quality of faculty. This category included the academic credentials of instructors, a performance review system for faculty that included student and peer evaluations, post-tenure review for tenured faculty, availability of faculty to students outside the classroom, and community or public service activities of faculty for which no extra compensation was paid.

Instructional quality. This category included class sizes and student/instructor ratio, number of credit hours taught by faculty, ratio of full-time faculty to other full-time employees, accreditation of degree granting programs, and institutional emphasis on quality teacher education and reform.

Institutional cooperation and collaboration. There were two indicators in this category. The first indicator was based on sharing the use of the college's resources (technology, equipment, supplies, and experts within the institution) with the business community and other institutions. The other indicator in this category was cooperation and collaboration with private industry.

Administrative efficiency. This category included the percentage of administrative costs as compared to academic costs, elimination of unjustified duplication and waste in administrative and academic programs, and the amount of general overhead costs.

Entrance requirements. This category included standardized test scores of students, activities and achievement of study body while in high school, post-secondary nonacademic achievements of student body, and the priority of enrolling in-state students.

Graduates' achievements. Indicators in this category included graduation rates, employment rate for graduates, employer feedback on graduates, licensure exam results, number of graduates who continued their education, and credit hours earned by graduates.

User-friendliness of institution. Indicators in this category were transferability of credits to and from the institution, continuing education programs, and accessibility of the institution to all citizens of the state.

Research funding. Indicators in this category were financial support for reform in teacher education and the amount of public and private sector grants.

Other countries besides the United States were interested in performance-based funding. Much like the United States, Great Britain's government wanted to improve the accountability of higher education in the eyes of the taxpayer (Gaither et al., 1994). The Jared Committee report resulted in the use of performance data not only for administrative purposes but also for funding in the 1990s (Gaither et al., 1994; Alberta Advanced Education and Career Development, 1997). Indicators on teaching and research were used in determining major funding for universities in the Netherlands beginning in 1993, and Finland began in 1987 using indicators for funding of research and postgraduate studies (Gaither et al., 1994).

Alberta, the first Canadian jurisdiction to link funding to performance, allocated over $15 million (2% of total operating grants) in awards to institutions of post-secondary education for school year 1997-98 based on four goals. The four goals developed by the Advanced Education and Career Development were accessibility, responsiveness and affordability of learning, and research excellence for universities. From the four goals, nine key indicators were created that had characteristics of "simplicity, comparability, reliability, [and] fairness" (Government of Alberta, 1997, p. 5). Benchmarks were set on each indicator and institutions were awarded points based on the results in comparison to the benchmarks. The amount of funding received based on the institution's progress was either 1.5% or .75% of the institution's operating grants (Government of Alberta, 1997).

In Alberta, much like the United States, the objective of performance-based funding was not to compare or rank institutions but to show areas of strength and where improvements were needed. Secondly, using performance measures provided financial incentive to institutions to focus goals and strategies toward the goals established by the government. Finally, using performance-based funding insured taxpayers of getting "maximum returns on their investment in post-secondary education" (Government of Alberta, 1997, p.11).

Tennessee, Kentucky, Florida, South Carolina, and Alberta were successful in legislatively adopting performance-based funding. However, not all policy makers that proposed performance-based funding were successful in legislation. Policy makers in Texas proposed a performance-based funding package that was not approved (Albright, 1996). Minnesota and Arkansas policy makers experimented with performance-based funding, but then dropped the procedure (Burke & Serban, 1998; Engelbach, 1997).

Texas legislature in 1991 directed the Texas Higher Education Coordinating Board to develop a new funding distribution based on a set of performance criteria (Ashworth, 1994; Hayes, 1995). After a number of public forums and teleconferences, state officials and educators agreed upon appropriation of funds distributed to each institution based on such goals as improving the quality of undergraduate teaching, increasing minority enrollment, and increasing the level of educational level in Texas. The amount of funding per institution depended on the college's percentage of total performance points. In 1993, the higher education board proposed that $50 million of the educational budget be used to support 13 proposed performance measures. Performance measures included, but was not limited to, such indicators as the number of undergraduate degrees awarded, minority students, minority graduates, community college transfers, and graduates in critical skill fields (Ashworth, 1994; Hayes, 1995). However, this proposal did not pass legislation in 1993, nor has performance based funding become part of the higher education funding package since then (Sharon Cox, Assistant Director of Finance, Texas Higher Education Coordinating Board, personal communication, September 17, 1998). Reasons for the proposal's failure varied. Some scholars believed it was because the proposal would take funds away from large powerful institutions who used political power to eliminate the threat (Albright, 1996). Others thought the proposal did not have enough support from legislators and representatives of institutions who saw detailed and state-wide reporting as a way to reduce institutional autonomy (Albright, 1996). Other scholars believed the reason for the failure of performance-based funding legislation was that the funding initiative was biased toward institutions that had a large concentration of minorities. Therefore, institutions that did not have a large concentration of minorities would not

support the proposal (Serban, 1997). Whatever the reason, performance-based funding remained a dead issue in the state of Texas.

The 1995 Minnesota legislature earmarked two percent of the state's general fund appropriation for a higher education performance incentive voluntary program (Engelbach, 1997; National Association of State Budget Officers, 1996). The earmarked funding was released to universities and colleges upon achievement of specified performance standards. However, since that time, Minnesota legislature has not passed any legislation requiring appropriations for higher education based upon performance criteria (Engelbach, 1997).

In 1994, the state of Arkansas approved a performance based funding program for school year 1995-96 based upon recommendations from Institutional Productivity Committee and staff from the State Board of Higher Education (Burke & Serban, 1998c; Dingrando, 1996). Sixteen performance measures were developed including retention/graduation rates, program quality, student achievement, diversity of faculty and staff, progress in industry and business training, and administrative cost effectiveness. For the school year 1995-96, five million dollars were appropriated to the 16 measures increasing the amount to $10 million for school year 1997. However with an election of a new governor, the general assembly in January, 1997 voted to abandon performance-based funding distributing the funds equally among the institutions (Burke & Serban, 1998c; Engelbach, 1997). Dissatisfaction for certain indicators was the downfall of the performance-based funding initiative. Two-year colleges argued against the initiative because indicators such as those pertaining to retention/graduation rates did not take into consideration a large segment of the student population, namely those that were part-time

and nontraditional. On the other hand, universities argued against the new funding program because of it lack of measures concerning research (Burke & Serban, 1998c). Both colleges and universities were united against the weighting of certain indicators (Burke & Serban, 1998c).

Performance-based funding, although praised by many supporters for its advantage of built-in accountability (Folger & Jones, 1993; Serban, 1997), had a number of objections against the concept. Indicators were often not clearly defined, thereby leaving the interpretation to individual colleges that created discrepancies and ambiguity in reported numbers (Gosnell & McCall, 1998; Serban, 1997). South Carolina had an indicator "community or public service activities of faculty for which no extra compensation is paid" that resulted in institutions polling faculty for community service (McCall & Gosnell, 1998). First, members of the faculty were defensive preferring to keep personal lives private. Secondly, without clear definition of the indicator, faculty members pondered what should and should not be reported as "community or public service activities." Did community or public service include such things as being a coach for Little League or a Sunday school teacher? Another indicator "class size" gave considerable problems to colleges in South Carolina (McCall & Gosnell, 1998). Average "class size" was deemed 16 to 21 students. In many vocational programs and health fields, state accreditation policies mandated lower class size, thus resulting in lost performance points for the college or university.

Data collection and reporting were paramount for performance-based funding forcing a number of colleges to hire additional staff and update technology. Additional staff and newer technology, both very costly to an institution, happened at a time when

decrease in state and federal funding occurred, and when colleges were encouraged to reduce overhead in order to become more efficient. In fact, thirty states reported that new data collection efforts were necessary for performance-based funding or performance assessment (Christal, 1998). Not only was data collection a problem, but the length of time it took to establish baselines, collect the data, report the data, and receive the funding often had a lag time from two to three years (Albright, 1995).

Colleges also reported the loss of congeniality between institutions as colleges competed for the same pot of funding destroying what communication many colleges struggled for over the years (McCall & Gosnell, 1998). Where leaders once sought to combine initiatives in securing funding, they were now competitive and argumentative over the way colleges reported data on performance indicators.

Many scholarly leaders believed institutional autonomy was threatened by common indictors (Serban, 1997). Requiring colleges that were so different in demographics, programs, and mission to comply with the common indicators was, in reality, forcing colleges to be the same. To accommodate autonomy, some states, such as Kentucky, had optional or discretionary indicators that provided flexibility in the funding program according to the uniqueness of the institution (Albright, 1996).

Difficulty in measuring results was the primary disadvantage for performance-based funding (Serban, 1997). Issues of reliability and validity were often disregarded when creating performance indicators (Neal, 1995), thus leaving many scholars to wonder if the indicators truly measured what was intended. Because of diverse mission, other scholars pondered the validity of comparisons that resulted between colleges, especially when funding was tied to the indicator (Neal, 1995).

Despite the arguments against performance-based funding, there were a number of proponents voicing strong support. Some supporters stated that performance-based funding "restored balance to a funding system that once rewarded enrollment instead of quality of education" (Albright, 1996, p.3).

Performance-based funding improved higher education (Burke & Serban, 1997). Out of the ten states reporting the use of performance-based funding, three to five states reported that there was an increase in effectiveness, greater productivity, and greater quality of education because performance funding shifted the focus from enrollment to teaching and learning (Christal, 1997). Colleges and universities were forced to examine mission statements, goals, and responsibilities to constituencies. In doing so, colleges found renewed liaisons and communications with political leaders and the surrounding community. Creating strategic plans to comply with new mission statements made the colleges more effective and productive. Focusing on teaching/learning and faculty development made the classrooms more productive in form of attrition, thus resulting in higher graduation and transfer rates.

An important advantage of performance-based funding was that in most cases (other than South Carolina), a small percentage of budget, usually between one and five percent, was budgeted above and beyond the budget for performance instead of replacing or taking away from the base budget. This made performance-based funding more attractive to institutions. The money was a supplement allowing many colleges and universities to enhance programs or start new ones (Serban, 1997).

Performance-base funding represented a "paradigm shift" from the state meeting the needs of the institution to the college or university meeting the needs of the state

(Christal, 1997, p. 3). This shift brought funding into a new era and a number of questions. Because performance-based funding was still in the experimental stages for many colleges in the middle to latter part of the 1990s, questions still remained. Albright (1996) summed it up eloquently:

> At what level should performance funding be? Incentive funding or full support of basic operations--which comes first? Is there a balance among performance funding and other programs? Some argue that unless adequate funding is provided for the entire system, performance funding is counterproductive and that basic funding needs and equity must come first. (p. 7)

Was performance funding counterproductive when considering equity in funding? As performance-based funding increased, did the degree of equity decrease, increase, or remain the same? How did the institutions fair in terms of adequately providing for the basic operating costs and the cost of continuance for colleges and universities over the years when performance funding increased? Because performance funding was relatively new in the late 1990s, these questions and others had not been answered. Colleges and universities had to wait at least two years upon implementation of performance funding before baseline studies could be finished and years until longevity studies could be done.

Sources of Revenue for Community Colleges in Florida

The public community college system in the state of Florida was chosen for the study. The State Board of Community Colleges governed the community college system (FLA. STAT. ch. 240.311 [Supp. 1994]). The community college system consisted of 28 public colleges (FLA. STAT. ch. 240.3031 [Supp. 1993]) having common definition, mission, and responsibilities (FLA. STAT. ch. 240.301 [Supp. 1994]). Funding to the community colleges was allocated through the Community College Program Fund (CCPF) (FLA. STAT. ch. 240.347 [1993]). The CCPF appropriations came from three state

revenue sources: the state's General Revenue (FLA. STAT. ch. 240.359 [1993]), the Florida Lottery (FLA. STAT. ch. 24.121 [1995]), and the Public Capital Outlay and Debt Service Trust Fund (PECO) (FLA. STAT. ch. 235.435 [Supp. 1994]). Dollars from the General Revenue and the Lottery were used to support operating costs of the college whereas PECO funds were used for capital outlay. The community colleges did not receive any support from local government and therefore, property taxes did not support higher education. Besides the Community College Program Fund, the community colleges received revenue from student tuition and fees (FLA. STAT. ch. 240.35 [1993]).

For the community colleges, approximately 60% of the total revenues came from the state's General Revenue Fund (Honeyman, 1995). The community college system also received 15% of the state's lottery proceeds (Summers, 1996).

The community college system received approximately 25% of its resources from student fees (Honeyman, 1995). Student fees included both matriculation and student tuition. Matriculation was the fee paid by students to support instruction. Tuition was defined as fees paid by out-of-state residents for instruction. Other special fees included those for laboratory and equipment, parking, application, and late registration. The amount of yearly increase for fees was restricted by legislature. Therefore, an increase in fees had to be approved by state legislation.

PECO funds were obtained from the 2.5% levy on all utilities and were used for planning and construction, equipment and repairs, and renovations (Honeyman, 1995). Students paid a building fee and capital improvement fee that was transferred to PECO funds. PECO funds were excluded from this study.

Florida's Funding Methodology

The 28 community colleges in the state of Florida for the school years 1994-95 and 1996-97 received funding for current operating expenses from three sources: state's General Revenue, the Florida Lottery, and student fees. The General Revenue appropriation for a new fiscal year was calculated by taking the previous year's Community College Program Fund allocation as a base and adding on reoccurring allocations and cost of continuance. Added to this new base were non-reoccurring allocations specific to the needs of individual colleges. For example, added to the Community College Program Fund for school year 1996-97 was an allocation marked Gender Equity. In this allocation, a total of $1,823,000 was split among 21 colleges to improve athletic programs for women (Division of Community Colleges, 1999). In another allocation, $893,547 was divided among four colleges that had damages due to a hurricane. Thus the General Revenue appropriation for the community college system included the Community College Program Fund and additional non-reoccurring allocations.

The total revenue package to the community colleges was the sum of the General Revenue appropriation (Community College Program Fund plus special non-reoccurring allocations), student fees, and lottery. In the 1994-95 school year, total revenue was $852,537,780 whereby approximately 58% of that package came from General Revenue, 25% from student fees, and 17% from the lottery (Division of Community Colleges, 1999). In the 1996-97 school year, total revenue was $932,511,469 whereby approximately 63% of that package came from General Revenue, 24% from student fees, and 13% from the lottery (Division of Community Colleges, 1999).

Performance-based funding was not included in the funding process for school year 1994-95. However, in the school year 1996-97, the funding process included an allocation of $12,000,000 that was once called the performance-based incentive and changed to performance-based budgeting (Burke & Serban, 1998c, p. 31). The allocation was distributed to the individual colleges based on the achievement of specific student outcomes. The performance-based incentive had three measures for 1996-97 (Conference Committee Report on House Bill 2715 [Fl. 1996]).

Measure I

The appropriation for this measure was $5 million. The number of points given depended on the number of students who completed a degree or received a certificate. The college received one point for each student who completed an Associate of Arts (AA) or Associate of Science (AS) degree. The college received 1/2 point for each student who completed a postsecondary vocational (PSV) or a postsecondary adult vocational (PSAV) certificate. The total number of points for each college was calculated by finding the sum of all AA, AS, and certificate points for that particular college. The total number of points for the community colleges was calculated by finding the sum of points for all 28 community colleges. The amount of funding each college was allocated from this measure depended on the ratio between the number of points for the individual college to the total number of points for the 28 community colleges. The ratio was changed to a percent by multiplying by 100. The individual college received that percentage of the $5 million appropriation. If, for example, a college had a total of 2,122 points, and the total points for all colleges was 39,632, then the particular college had 5.3543% of the total.

Therefore, the college's allocation was 5.35430% of the $5 million appropriation, or approximately $267,715.

Measure II

The appropriation for this was $5 million. Students who completed a degree or certificate were tracked from 1991-1996. If a student had been enrolled at any time during the tracking period in a college preparatory course the college received an additional point. If the student received Pell, a grant for vocational rehabilitation, National Defense Student Loan (NDSL), Federally Insure Loan, Federal Work/Study, or Project Independence during the tracking period, the college received an additional point. If a student were reported in Federal Classification of Disabled during that tracking period, the college received another point. If the student were enrolled in "English as a Second Language (ESL)" courses during this tracking period, the college received another point. The college received an additional point if a student passed a licensure test or if the AS degree or certificate degree student were placed in a job. The individual college allocation was determined by the percent of points earned in relation to the total points in the state multiplied by the $5 million.

Measure III

The appropriation for this measure was $2 million. The measure was based on the number of excess hours required by a student to complete an AA degree. Excess hours were calculated for each student who received an AA degree. The college received an additional point if the number of excess hours for a student were 12 hours or below. College preparatory classes were not included in the count for excess hours.

Summary

"Fairness," or equity, was a major consideration when dollars for education are distributed. The principle of horizontal equity was equal treatment of equals whereas vertical equity was unequal treatment of unequals. To measure the degree of equity for a state's funding formula, a number of statistics were used. The statistical measures were range, restricted range, federal range ratio, coefficient of variation, Gini coefficient, and the McLoone index. These statistical measures and the funding mechanism "revenue per student" were verified over time through documented use in preK-12 education finance. The statistical measures used in the public education finance were extended to higher education using the same funding mechanism, "revenue per student."

Performance-based funding became part of the funding model for a number of states in the 1990s. The objective of performance-based funding was to improve higher education, re-establish creditability with policy makers and the public, justify additional funding, and guarantee that there was a maximum return on the investment of education. The amount of funding provided to institutions was based on the achievement of specific performance indicators developed by policy makers or coordinating boards of colleges.

Community colleges received financial support from the state government and student fees and tuition. A number of community colleges received local support. On the average nationally, 50% of the community colleges funding was derived from the state, 21% from local taxes, 20% from student fees and tuition, 4% from the federal government, and 4% from other sources.

State resources were distributed to individual community colleges through a number of different funding methodologies, of which formula funding was the most

popular. By the 1990s, a number of states began incorporating performance-based funding whereby some dollars or total revenue were allocated according to an institution's performance on specified measurable outcomes chosen by the state.

State revenue, lottery proceeds, and student tuition and fees financially supported the 28 community colleges in Florida. The funds were allocated through the Community College Program Fund by means of a funding formula. The funding formula, although it had been consistent in the past years, changed due to legislative interest in holding colleges accountable for revenues received. In the school year 1996-97, the funding formula for the community college system included an appropriation that was based on three measurable outcomes. The amount of allocation for each community college depended on the ratio of the number of points received for each of the three measures by the individual college to the total number of points in the state for the measure multiplied by the amount of money appropriated for the measure.

CHAPTER 3
RESEARCH METHODOLOGY

Introduction

The purpose of this study was to extend the concept of fiscal equity in community colleges by testing the effects of statistical measurements prevalent in public school equity studies on a community college funding system. A further purpose was to examine the change in fiscal equity resulting from the implementation of a performance-based funding system on a state-wide multi-institution community college program. Using the statistical measurements for analyzing the degree of equity developed for public school finance studies, the researcher analyzed the degree of horizontal equity on a distribution of funds for a public multi-institution community college system prior to and following the implementation of performance-based funding. The state chosen for the study was Florida. The statistical measurements used in preK-12 education equity studies, as described by Berne and Stiefel (1984) and Thompson et al. (1994), were range, restricted range, federal range ratio, coefficient of variation, Lorenze curve depicting the Gini coefficient, and the McLoone index. The research methodology was nonexperimental using population data for Florida's public multi-institution community college system where performance-based funding was recently introduced. The degree of equity within the state's funding formula was analyzed the year prior to the use of performance-based funding (1994-95) and the first year performance-based funding was implemented for all community colleges in the system (1996-97). The 1996-97 funding formula was analyzed with and without the

performance allocation. The objective of the study was to analyze the degree of equity for each year's funding formula to see if performance-based funding made a difference in horizontal equity. The questions asked were:

1. What were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding?
2. What were the effects on the degree of horizontal equity upon Florida's funding formula for the 28 public community colleges when performance-based funding was implemented?

Population of the Study

The public multi-institution community college system in the state of Florida was chosen for the study. The State Board of Community Colleges governed the community college system (FLA. STAT. ch. 240.311 [Supp. 1994]). The community college system consisted of 28 public colleges (FLA. STAT. ch. 240.3031 [1993]) having common definition, mission, and responsibilities (FLA. STAT. ch. 240.301 [Supp. 1994]). Funding to the community colleges was allocated through the Community College Program Fund (CCPF) (FLA. STAT. ch. 240.347 [1993]).

The Florida Department of Education, Division of Community Colleges (1999), provided data from the financial database on a CD-ROM. The data included revenue allocated through the Community College Program Fund from the state's General Revenue Fund, student fees, lottery proceeds, and enrollment in the form of FTE. Performance-based funding was not used in appropriations for the school year 1994-95, but used for all 28 community colleges in school year 1996-97. The pilot year, 1995-96, was not included

in this study. Therefore, school years chosen for the study were 1994-95 and 1996-97. Raw data provided by the Division of Community Colleges may be found in appendix following chapter five.

Methodology

The 28 community colleges in the state of Florida for the school years 1994-95 and 1996-97 received funding for current operating expenses from three sources: state's General Revenue (FLA. STAT. ch. 240.359 [1993]), the Florida Lottery (FLA. STAT. ch. 24.121 [1995]), and student fees (FLA. STAT. ch. 235.435 [Supp. 1994]). The General Revenue appropriation for a new fiscal year was calculated by taking the previous year's Community College Program Fund allocation as a base and adding on reoccurring allocations and cost of continuance. Added to this new base were non-reoccurring allocations specific to the needs of individual colleges. For example, added to the Community College Program Fund for school year 1996-97 was an allocation marked Gender Equity. In this allocation, a total of $1,823,000 was split among 21 colleges to improve athletic programs for women (Division of Community Colleges, 1999). In another allocation, $893,547 was divided among four colleges that had damages due to a hurricane. Thus the General Revenue appropriation for the community college system included the Community College Program Fund and additional non-reoccurring allocations.

Disparity in the distribution of total revenue to the individual institutions by means of a funding formula was analyzed through the variable "total revenue per full-time equivalent student (FTE)." Full-time equivalent student count was calculated by all community colleges in the same way as denoted by Florida State Board of Education

Administrative Rule 6A- 14.076 (Florida State Board of Education, 1998). The total revenue was the sum of the General Revenue appropriation (Community College Program Fund plus special non-reoccurring allocations), student fees, and lottery. Total revenue per FTE was calculated by dividing total revenue by the full-time equivalent student count (FTE). Total revenue per FTE was calculated for each community college in the system. For the purpose of this study, "total revenue per FTE" was often cited as "per-student revenue" or "revenue per student."

The degree of horizontal equity was measured using the most common six statistical measurements prevalent in public school finance studies. These measurements were range, restricted range, federal range ratio, coefficient of variation, Gini coefficient as depicted by the Lorenze curve, and the McLoone index. These six statistical measurements were described as the most frequently used (Berne & Stiefel, 1984; Thompson et al., 1996), well described, and generally accepted (Cronk & Johnson, 1983) measurements of dispersion.

Range

The range was a measure used to examine the spread of the per-student revenue distribution. For each year in the study, the 28 community colleges were arranged in ascending order according to per-student revenue. The range was calculated by taking the highest per-student revenue value and subtracting the lowest per-student revenue value. Therefore, RANGE = Highest X_i - Lowest X_i where X_i was the per- student revenue for the institution in a particular year. The smaller the value of the range, the better the equity (Thompson et al., 1994; Verstegen, 1996; Verstegen & Salmon, 1989). The range was limited because it was based upon only two observations, the highest and the lowest, and

ignored all other observations between the highest and lowest (Thompson et al., 1994; King, 1983; Mark & Carruthers, 1982). The range was calculated on the data for school year 1994-95 that was prior to the implementation of performance-based funding. The range was calculated on per-student revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97 restricted range was calculated on per-student revenue data with and without performance funding.

Restricted Range

The restricted range was a measure used to examine the spread of the distribution by ignoring the extreme highest and lowest observations. The 28 community colleges were placed in ascending order according to per-student revenues. The top observations beyond the 95th percentile and the lowest observations below the 5th percentile were disregarded. The calculation for the restricted range was the difference between the observation at the 95th percentile and the 5th percentile. Thus $RRANGE = Highest_{95th\%} - Lowest_{5th\%}$. The smaller the spread in the distribution, the greater the equity. However, this measurement was based on two observations and ignored the variations in the middle. The restricted range was calculated on the data for school year 1994-95 that was prior to the implementation of performance-based funding. The restricted range was calculated on per-student revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97 restricted range was calculated on per-student revenue data with and without performance funding.

Federal Range Ratio

The federal range ratio was calculated by taking the restricted range and dividing by the per-student revenue at the 5th percentile. Solving the formula yielded "a value

expressed as a ratio wherein the smaller the value, the less variation or inequity in the distribution" (Thompson et al., 1994, p. 248). Therefore, smaller the value of the federal range ratio, the greater the equity of the distribution (King, 1983; Thompson et al., 1994; Verstegen, 1996; Verstegen & Salmon, 1989). The federal range ratio expressed how much larger the observation at the 95^{th} percentile was than the observation at the 5^{th} percentile (Hirth, 1994, p.174). The federal range ratio was calculated on the data for school year 1994-95 that was prior to the implementation of performance-based funding. The federal range ratio was calculated on per-student revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97 the federal range ratio was calculated on per-student revenue data with and without performance funding.

Coefficient of Variation

Coefficient of variation was defined as the square root of the variance divided by the mean (Berne & Stiefel, 1984; Thompson et al., 1994) or the standard deviation divided by the mean (Bezeau, 1979; King, 1983; Odden, 1992; Verstegen, 1996; Verstegen & Salmon, 1989). The per-student revenue mean ($\bar{y}$) was obtained by taking the sum of all the colleges' per-student revenue and dividing by 28. Thus,

$$\bar{y} = \frac{\sum y_i}{28}$$

where y_i = per-student revenue for the college

$\sum y_i$ = sum of per-student revenue for all colleges

The coefficient of variation (CV) formula is:

$$CV = \frac{\sqrt{\dfrac{\sum e_i(\bar{y} - y_i)^2}{E}}}{\bar{y}}$$

where e_i = number of student FTE for the college

E = total FTE for all colleges

The coefficient of variation measured relative variation and was described by researchers as being independent of the mean (Bezeau, 1979; Mark & Carruthers, 1982). The coefficient of variation provided an assessment of the distribution of revenues about the mean by revealing the variations in revenues for given proportions of students in the state (King, 1983). For this statistical measure, the result was a number between zero and one. The closer the coefficient of variation was to zero, the better the equity of the funding program (King, 1983; Jones & Salmon, 1985; Odden, 1992; Thompson et al., 1994; Verstegen, 1996; Verstegen & Salmon, 1989). The coefficient of variation was calculated on per-student revenue data for school year 1994-95 that was prior to the implementation of performance-based funding. The coefficient of variation was calculated on per-student revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97, the coefficient of variation was calculated on per-student revenue data with and without performance funding.

McLoone Index

The McLoone index was a unique statistical measure for school finance (Odden, 1992; Thompson et al., 1994) that measured the degree of equity in the lower half of the distribution of revenues (Berne & Stiefel, 1984; King, 1983; Odden, 1992; Thompson et al., 1994;Verstegen, 1987, 1996; Verstegen & Salmon, 1989). When measuring the degree of horizontal equity, the McLoone index (MI) was calculated as the ratio of the sum of all revenues below the median to the sum of all revenues that would be required if all revenues below the median were brought up to the median level. Thus,

$$\text{MI} = \frac{\sum_{i=1}^{N} S_i R_i}{M * \sum_{i=1}^{N} S_i}$$

where S_i = number of students (FTE) for each college

R_i = per-student revenue for each college

$\sum_{i=1}^{N} S_i R_i$ = total revenue of colleges below the median

N = number of colleges whose per-student revenue were below the median.

S = number of students (FTE) in each college whose revenue was below the median.

M = median per-student revenue.

For this measurement, the number calculated was a number between zero and one. The closer the McLoone index was to one, the greater the equity of the lower half of the distribution. As Odden (1992) stated, the McLoone index was important because the "American political culture often shows an interest in the condition of those at the bottom" (p. 77) and, therefore, the McLoone index was a "statistic that reflects that value perspective" (Odden, 1992, p. 77). The McLoone index was calculated on the data for school year 1994-95 that was prior to the implementation of performance-based funding. The McLoone index was calculated on revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97, the McLoone index was calculated on revenue data with and without performance funding.

Gini Coefficient

The Gini coefficient was a wealth neutrality test for public school finance studies. Wealth neutrality was the relationship between the measured school district's wealth (local

support through taxes) and the per-pupil expenditures of the school district (Hickrod et al., 1980; Thompson et al., 1994). The Gini coefficient showed how far the distribution was from providing each percentage of students with equal percentage of expenditures (Odden et al., 1979; Kearney & Chen, 1989; Thompson et al, 1994). In this study, wealth was defined as state revenue plus tuition and fees, as described in Harrell's study (1992). The Gini coefficient indicated how far the distribution of revenue was from providing each percentage of students with an equal percentage of revenue. The Gini coefficient was a number between zero and one. The closer the calculated value was to zero, the more equitable the revenue distribution was in providing a given percentage of students with an equal percentage of revenue (Berne & Stiefel, 1984; Jones & Salmon, 1985; Odden, 1992; Thompson et al., 1994). The Gini coefficient was calculated for horizontal equity for each year indicated. The formula used for the Gini coefficient was

$$\text{Gini Coefficient} = \frac{\sum_i \sum_j P_i P_j \left| X_i - X_j \right|}{2(\sum_i P_i)^2 \mu}$$

where $\sum \sum_j$ was the summation of all institutions i, j from

i = 1 to N and from j = 1 to N

N = the number of institutions in the system

P_i = the student FTE for institution i

P_j = the student FTE for institution j

μ = population mean per-student expense or revenue value

X_i = per-student expense or revenue for institution i

X_j = per-student expense or revenue for institution j.

Lorenze Curve

For the Lorenze curve, the horizontal axis indicated the percent increments of the number of full-time equivalent students (FTE) in the state attending community colleges. The vertical axis indicated the percent increments of total revenue distributed to the community colleges. Perfect equity in the funding formula would result in a straight 45-degree line signifying that 10% of the students received 10% of the revenue, 20% of the students received 20% of the revenue . . .90% of the students received 90% of the revenue, etc. A funding formula that was not equitable would result in a concave curve (sagging line) that existed below the perfect 45-degree line (perfect-equity line). The Gini coefficient was the ratio of the area between the curve and the perfect-equity line to the total area beneath the perfect-equity line. The closer the Lorenze curve was to the perfect line of equity, then the better the equity of the distribution. The Gini coefficient was calculated and the Lorenze curved was constructed on the data for school year 1994-95 that was prior to the implementation of performance-based funding. The Gini coefficient was calculated and the Lorenze curve was constructed on revenue data for school year 1996-97 when performance-based funding was implemented. For the school year 1996-97, the Gini coefficient was calculated and the Lorenze curve was constructed on revenue data with and without performance funding.

If the Lorenze curve crossed over the line of equal distribution (the perfect 45-degree horizontal line), then an alternate formula derived by Lows was used. This alternative Gini coefficient was called the Gini coefficient for bivariate set of measures or Bigini (Cohn & Smith, 1989; Lows, 1984; Peevely & Ray, 1989). The formula was:

$$\text{Bigini Coefficient} = \sum_{i=1}^{n} \left| X_i^2 - X_{i-1}^2 - X_i Y_i - X_i Y_{i-1} + X_{i-1} Y_i + X_{i-1} Y_{i-1} \right|$$

where Y_i = cumulative proportion of total expenditure or revenue

X_i = cumulative proportion of students from poorest to richest institution

n= number of institutions plus the number of cross over points.

To locate the points of intersection (cross over points) the following formula was used:

$$Z = \frac{X_{i-1}Y_i - X_iY_{i-1}}{(Y_i - Y_{i-1}) - (X_i - X_{i-1})}$$

The cross over point was (Z,Z).

The study resulted in six univariate dispersion measures for each of the two school years indicated, namely 1994-95 and 1996-97, both before and after the incorporation of performance-based funding. The degree of horizontal equity was analyzed using the six measures. The results were then compared.

CHAPTER 4
ANALYSIS OF DATA

Introduction

The purpose of this study was to extend the concept of fiscal equity in community colleges by testing the effects of statistical measurements prevalent in public school equity studies on a community college funding system. A further purpose was to examine the change in fiscal equity resulting from the implementation of a performance-based funding system on a state wide multi-institution community college program. Using the statistical measurements for equity developed for public school finance studies, the researcher analyzed the degree of horizontal equity of total revenue per full-time equivalent student (per-student revenue) for the 28 public community colleges in the state of Florida prior to and following the implementation of performance-based funding. Total revenue was considered funding from the state's General Revenue Fund, lottery proceeds, and student fees. The state's General Revenue appropriation for the community college system included funds for the Community College Program Fund with the addition of non-reoccurring allocations. Non-reoccurring allocations were special allocations included in a specific year's funding but not added to the base for continuance in the next fiscal year's budget. For the year when performance-based funding was implemented, the state's General Revenue appropriation to the Community College Program Fund was considered with and without the performance allocation of $12 million. Per-student revenue was calculated by taking the total revenue and dividing it by the full-time equivalent student count (FTE). All public community colleges in the system calculated full-time equivalent

student count according to rule 6A-14.076 in the Florida State Board of Education Administrative Rules (Florida State Board of Education, 1998).

The study was designed to be nonexperimental using population data for the public multi-institution community college system in Florida for school year 1994-95, before implementation of performance-based funding, and school year 1996-97 when performance-based funding was implemented for the college system. The State Board of Community Colleges governed the community college system (FLA. STAT. ch. 240.311 [Supp. 1994]). The community college system consisted of 28 public colleges (FLA. STAT. ch. 240.3031 [1993]) having common definition, mission, and responsibilities (FLA. STAT. ch. 240.301 [Supp. 1994]). Funding to the community colleges was allocated through the Community College Program Fund (CCPF) (FLA. STAT. ch. 240.347 [1993]). The Florida Department of Education, Division of Community Colleges (1999), provided data from the financial database on a CD-ROM that may be found in the appendix following chapter five. The objective of the study was to analyze the degree of equity for each year's funding formula to ascertain if performance-based funding made a difference in horizontal equity (i.e., the equal treatment of equals). The statistical measures used were range, restricted range, coefficient of variation, McLoone index, the Gini coefficient, and the Lorenze curve.

The purpose of this chapter is to present the results of the analysis of data according to the two questions asked:

1. What were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding?

2. What were the effects on the degree of horizontal equity upon Florida's funding formula for the 28 public community colleges when performance-based funding was implemented?

Equity Before and after the Implementation of Performance-based Funding

The findings for the first research question--what were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding – were obtained through the use of horizontal equity measures. The findings for the second research questions – what were the effects on the degree of horizontal equity upon Florida's funding formula for the 28 community colleges when performance-based funding was implemented – were also obtained through the use of horizontal equity measures. Raw data for FTE and total revenue may be found in the appendix following chapter five.

Range

The range was a measure used to examine the spread of the per-student revenue distribution. The 28 community colleges were arranged in ascending order according to per-student revenue. The range was calculated by taking the highest per-student revenue and subtracting the lowest per-student revenue. The smaller the value of the range, the better the equity of the funding formula (Thompson et al., 1994; Verstegen, 1996). The range was calculated on revenue data for school year 1994-95 that was prior to the implementation of the performance-based funding. The range was calculated on revenue data for school year 1996-97 when performance-based funding was implemented. For school year 1996-97 the range was calculated on revenue data with and without performance funding.

Table 4-1

Range for Per-student Total Revenue

Year	Highest	Lowest	Range
1994-95 (Before)	$6,282.76	$3,577.56	$2,705.20
1996-97 (With)	$7,668.17	$4,059.33	$3,608.84
1996-97 (Without)	$7,594.35	$4,019.72	$3,574.63

The range was smallest for school year 1994-95 prior to the implementation of performance-based funding. The range was largest for school year 1996-97 using revenue that included performance-based funding. The increase in the range calculation indicated there was a decrease in equity from school year 1994-95 to 1996-97 when considering the spread in the distribution on per-student revenue. As for year 1996-97, the increase in the range calculation for per-student revenue when performance-based funding was included in the funding formula indicated that equity for the spread in the distribution decreased when performance was added to the funding formula.

Restricted Range

The restricted range was a measure used to examine the spread of the distribution by ignoring the extreme highest and lowest per-student revenue. The 28 community colleges were placed in descending order according to per-student revenue. The top observation and the lowest observation were disregarded. The calculation for the restricted range was the difference between the per-student revenue at the 95^{th} percentile and per-student revenue at the 5^{th} percentile. The smaller the spread in the distribution indicated a better equity in the funding formula. The restricted range was calculated on

per-student revenue for school year 1994-95 prior to the implementation of performance-based funding. The restricted range was calculated on per-student revenue for school year 1996-97 on revenue with and without performance funding.

Table 4-2

Restricted Range for Per-student Total Revenue

Year	95^{th} Observation	5^{th} Observation	Restricted Range
1994-95 (Before)	$5,696.31	$3,601.06	$2,095.25
1996-97 (With)	$6,699.77	$4,071.30	$2,628.47
1996-97 (Without)	$6,617.29	$4,022.51	$2,594.78

The restricted range was smallest for school year 1994-95 prior to the implementation of performance-based funding. The restricted range was largest for school year 1996-97 using revenue that included performance-based funding. The increase in the restricted range calculation indicated there was a decrease in equity from school year 1994-95 to 1996-97 when considering the spread in the distribution on per-student revenue at the 95^{th} percentile and 5^{th} percentile. As for year 1996-97, the increase in the restricted range calculation for per-student revenue when performance-based funding was included in the funding formula indicated that equity for the spread in the distribution decreased when performance was added to the funding formula.

Federal Range Ratio

The federal range ratio was calculated by taking restricted range value and dividing it by the per-student revenue at the 5^{th} percentile. The federal range ratio expressed how

much larger the observation at the 95th percentile was than the observation at the 5th percentile (Hirth, 1994, p.174). The smaller the federal range ratio, the greater the equity of the distribution. The federal range ratio was calculated on per-student revenue for school year 1994-95 that was prior to the implementation of performance-based funding. For the school year 1996-97, the federal range ratio was calculated on the per-student revenue with and without performance-based funding.

Table 4-3

Federal Range Ratio for Per-student Total Revenue

Year	Federal Range Ratio
1994-95 (Before)	0.5818
1996-97 (With)	0.6456
1996-97 (Without)	0.6450

The federal range ratio was lowest for school year 1994-95 prior to the implementation of performance-based funding. The federal range ratio was higher for school year 1996-97 using revenue that included performance-based funding. The increase in the federal range ratio calculation indicated there was a decrease in equity from school year 1994-95 to 1996-97. The change in the federal range ratio from school year 1994-95 to 1996-97 indicated that there was a greater spread between the per-student revenue observation in the restricted range in school year 1996-97 than in school year 1994-95. The federal range ratio value of 0.5818 in 1994-95 indicated that the per-student revenue at the 95th percentile was 1.58 times the per-student revenue at the 5th percentile. The spread increased for school year 1996-97 using data with performance-based funding. The

federal range ratio value of 0.6456 indicated that the per-student revenue at the 95th percentile was 1.6456 times the per-student revenue at the 5th percentile. The spread had increased by 6.48% from school year 1994-95 to school year 1996-97 with performance-based funding, thus indicating that the degree of equity in the spread of the per-student revenue when ignoring extreme observations had decreased.

As for year 1996-97, the slight increase (0.006) in the federal range ratio when performance-based funding was included in the funding formula indicated that equity in the distribution decreased minutely when performance was added to the funding formula.

Coefficient of Variation

The coefficient of variation was defined as the standard deviation divided by the mean (Thompson et al., 1994; Odden, 1996). The coefficient of variation measured the relative variation in the distribution about the mean. The closer the coefficient of variation was to zero the better the equity of the distribution. The coefficient of variation was calculated on per-student revenue for school year 1994-95 that was prior to the implementation of performance-based funding. The coefficient of variation was calculated on per-student revenue for school year 1996-97 with and without performance funding.

The low values for the coefficient of variation indicated that the funding formulas for each of the school years were close to equitable. The coefficient of variation was lowest for school year 1994-95 prior to the implementation of performance-based funding. The coefficient of variation was highest for school year 1996-97 with performance-based funding. The increase in the coefficient of variation calculation indicated there was a decrease in equity from school year 1994-95 to 1996-97 with performance-based funding.

Table 4-4

Coefficient of Variation for Per-student Total Revenue

Year	Coefficient of Variation
1994-95 (Before)	0.1343
1996-97 (With)	0.1488
1996-97 (Without)	0.1488

The coefficient of variation also revealed the "variation in the revenues for given proportions" students in the state (King, 1983, p. 73-74). The value of 0.1343 for school year 1994-95 indicated that two-thirds of the FTE had revenue levels within 13.43% of the mean. The value of 0.1488 for school year 1996-97 with performance-based funding indicated that two-thirds of the FTE had revenue levels within 14.88% of the mean. The 1.45% increase from school year 1994-95 to 1996-97 with performanced-based funding indicated a decrease in the degree of equity.

As for year 1996-97, there was no change in the coefficient of variation when comparing the funding formula with and without performance-based funding.

McLoone Index

The McLoone index measured the degree of equity in the lower half of the distribution of per-student revenue. The McLoone index was calculated as the ratio of the sum of all revenues below the median to the sum of revenues that would be required if all revenues below the median were brought up to the median level. The closer the McLoone index was to one, the greater the equity of the lower half of the distribution. The McLoone index was calculated on the revenue data for school year 1994-95 prior to the

implementation of performance-based funding and on the revenue for school year 1996-97 with and without performance-based funding.

Table 4-5

McLoone Index for Per-student Total Revenue

Year	McLoone Index
1994-95 (Before)	0.9050
1996-97 (With)	0.8808
1996-97 (Without)	0.8813

The high values for the McLoone index indicated that the funding formulas were close to equitable for each of the school years. However, the calculation for the McLoone index was lower in school year 1996-97 than in school year 1994-95. The McLoone index value of 0.9050 for school year 1994-95 when compared to the value 0.8808 for school year 1996-97 with performance-based funding indicated that there was a 2.4% decrease in the degree of equity from school year 1994-95 to 1996-97 for those schools below the median. The results of the McLoone index indicated that equity for those schools whose per-student revenue was below the median decreased in the year performance-based funding was implemented.

As for year 1996-97, the small decrease (.0005) in value for the McLoone index when performance-based funding was included in the funding formula indicated that equity in the distribution decreased slightly when performance was added to the funding formula. However, because the decrease was so small, the shift in equity was minimal.

Gini Coefficient

The calculation for the Gini coefficient indicated how far the distribution was from providing each percentage of students with an equal percentage of revenue (Odden et al., 1979; Kearney & Chen, 1989; Thompson et al., 1994). Because the Gini coefficient was a wealth neutrality test, the calculation indicated the relationship between the school district's wealth and the per-pupil expenditures of the school district (Hickrod et al., 1980; Thompson et al., 1994). In this study, wealth was defined as state revenue plus student fees as described in Harrell's study (1992). The closer the calculated value was to zero, the more equitable the revenue distribution in providing a given percentage of students with an equal percentage of revenue (Berne & Stiefel, 1984; Odden, 1992; Thompson et al., 1994).

Table 4-6

Gini Coefficient of Per-student Total Revenue

Year	Gini Coefficient
1994-95 (Before)	0.0575
1996-97 (With)	0.0605
1996-97 (Without)	0.0602

The low values for the Gini coefficient indicated that the funding formulas were close to equitable for each of the school years. The Gini coefficient was lowest for school year 1994-95 prior to the implementation of performance-based funding. The Gini coefficient was highest for school year 1996-97 using revenue that included performance-

based funding. The increase in the Gini coefficient indicated there was a decrease in equity from school year 1994-95 to 1996-97 with performance-based funding.

As for year 1996-97, the small increase (.0003) in value for the Gini coefficient when performance-based funding was included in the funding formula indicated that equity in the distribution decreased slightly when performance was added to the funding formula. However, because the increase is so small (.0003), the shift in equity was minimal.

Lorenze Curve

The Lorenze curve was a graphic picture illustrating the Gini coefficient. The colleges were sorted in ascending order for per-student revenue. The horizontal axis represented the cumulative proportion of students in the form of FTE. The vertical axis represented the cumulative proportions of total revenue accounted for by the colleges. The 45-degree (diagonal) line represented perfect equity indicating that 10% of the students received 10% of the revenue, 20% of the students received 20% of the revenue, etc. A funding formula that was not equitable would result in a concave curve (sagging line) that existed below the perfect 45-degree line (perfect-equity line). The sagging line represented an inequity in the funding formula in meeting the needs of the colleges. The Gini coefficient represented the sagging line's variation from the perfect line of equity. The Gini coefficient was the ratio of the area between the curve and the perfect-equity line to the total area beneath the perfect-equity line. The closer the curve was to the perfect line of equity, the better the equity of the distribution.

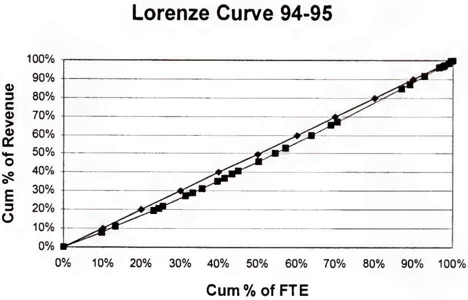

Figure 4-1

Lorenze Curve for School Year 1994-95 Prior to Implementation of Performance-based Funding

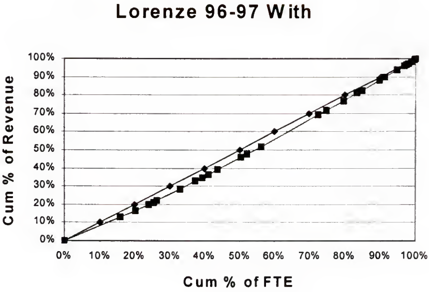

Figure 4-2

Lorenze Curve for School Year 1996-97 With Performance-based Funding

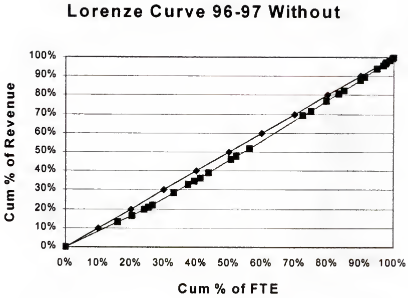

Figure 4-3

Lorenze Curve for School Year 1996-97 Without Performance-based Funding

The Lorenze curves indicated that allocations of revenues along with tuition and fees were close to equitable for both school years. The 1994-95 school year was more equitable than school year 1996-97. As for school year 1996-97, there was little difference in the Lorenze curve when considering the addition of performance-based funding.

Using the 1996-97 Funding Model for Projections

There was a minimal shift in equity for school year 1996-97 when comparing fundings with and without performance-based funding. However, in this case, one must consider the amount of revenue tied to performance-based funding. For school year 1996-97, performance-based funding was only 1.3% of total revenue. Total revenue including the performance allocation was approximately $932 million whereas the performance

Table 4-7

Projected Performance-based Funding on School Year 1996-97

1996-97	Federal Range Ratio	Coefficient of Variation	McLoone Index	Gini Coefficient
Actual (1.3%)	0.65	0.15	0.88	0.06
6%	0.65	0.15	0.90	0.06
12%	0.65	0.15	0.89	0.08
25%	0.67	0.16	0.85	0.08
50%	0.81	0.19	0.80	0.10
75%	1.14	0.22	0.77	0.12

allocation was only $12 million. Therefore, one would expect the effect of performance-based funding to be minimal when considering the ratio of the performance allocation to total revenue.

Considering that the performance-based allocation was only 1.3% of total revenue for school year 1996-97, what would happen to the degree of equity if performance allocations were larger? Using the funding model for school year 1996-97 with performance-based funding, the researcher projected such results. Projections illustrating performance-based funding as 6%, 12%, 25%, 50%, and 75% of total revenue indicated that with an increase of performance-based funding, the degree of equity decreased. Each measure is discussed separately.

Federal Range Ratio

There was no change in the federal range ratio when performance-based funding was projected at a level of six percent or 12%. The value of 0.65 indicated that the per-

student revenue at the 95th percentile was 1.65 times greater than the per-student revenue at the 5th percentile whether the performance-based funding level was six or twelve percent of total revenue. At a level of 25%, the federal range ratio increased by two percent indicating that the spread between the per-student revenue observation at the 95th percentile and the per-student revenue observation at the 5th percentile increased. The federal range ratio value of 0.67 indicated that the per-student revenue at the 95th percentile was 1.67 times greater than the per-student revenue at the 5th percentile.

A change occurred when performance-based funding was projected at 50% and 75% of total revenue. The value of 0.81 for the 50% level was an increase of 14% from the 25% level indicating that the spread between the 95th percentile observation and the 5th percentile observation had increased by 14% when the projected level of performance-based funding increased another 25%. When the level of performance-based funding increased another 25% (to 75% of the total revenue package), the spread increased by 47%. Likewise, the 0.81 for the 50% level indicated that the per-student revenue observation at the 95th percentile was 1.81 times greater than the per-student observation at the 5th percentile. Even more dramatically, the federal range ratio value of 1.14 at the 75% level indicated that the per-student revenue at the 95th percentile was 2.14 times (214%) greater than the per-student revenue at the 5th percentile. As the projections indicated, if performance-based funding had been 25% or higher of total revenue, the spread in the restricted range would have increased, thus greatly decreasing the degree of equity in the funding formula.

Coefficient of Variation

The coefficient of variation did not change when performance-based funding was six percent or 12% of total revenue. However, when performance-based funding was 25% of total revenue, the coefficient of variation increased from 0.15 to 0.16. The 0.01 increase indicated there was a one-percent increase in the coefficient of variation. This increase indicated that there was a decrease in the degree of equity when performance-based funding was projected to 25% of total revenue. There was a large decrease in the degree of equity as performance-based funding grew from 25% of total revenue to 50% and 75% as the coefficient of variation increased from 0.16 to 0.19 and 0.22, respectively. This increase in the coefficient of variation indicated that as performance-based funding grew to 50% and 75% of total revenue, the degree of equity according to the coefficient of variation decreased by 3% and 6%, respectively.

McLoone Index

The McLoone index was closer to one (0.90) when performance-based funding was six percent of total revenue when compared to the actual performance-based funding level of 1.3% (0.88) in school year 1996-97. This change indicated that the degree of equity in the lower half of the distribution of per-student revenue was higher when the level of performance-based funding increased from 1.3% to 6%. However, from the projections at 12%, 25%, 50%, and 75% levels, the degree of equity quickly declined. From the 25% level to the 50% level, the degree of equity decreased by four percent; from the 50% level to the 75% level, the degree of equity decrease another 3%. Except for the six-percent level, the degree of equity decreased as performance-based funding increased.

The researcher could not find a logical reason for the increase in the degree of equity from the 1.3% level to the 6% level.

Gini Coefficient

The value of the Gini coefficient increased as the performance-based funding increased in stages. There was no change when the performance-based funding increased from the actual level of 1.3% of total revenue to the 6% level. There was a 2% increase in the Gini Coefficient as the performance-based level increased from 6% to 12%. From the 12% level to the 25% level, the Gini coefficient remained the same. There was a 2% increase from the 25% level to the 50% level and another 2% increase from the 50% level to the 75% level. This increase in the Gini coefficient indicated that the degree of equity decreased as the performance-based funding level increased. The increase in the Gini coefficient indicated that with the increase of performance-based funding the funding formula's ability to provide an equal percentage of students with an equal percentage of revenue decreased.

Lorenze Curve

Because no change or small changes were indicated in equity when performance-based funding was 6% or 12% of total revenue, the Lorenze curves chosen for viewing were those depicting the change in equity when performance-based funding was 25%, 50%, or 75% of total revenue. Included in the display for comparison was also the original Lorenze curve illustrating the actual 1996-97 total revenue where performance-based funding was 1.3% of total revenue.

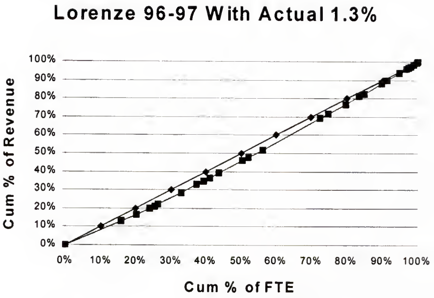

Figure 4-4

Lorenze Curve for School Year 1996-97 with Actual Performance-based Funding 1.3% of Total Revenue

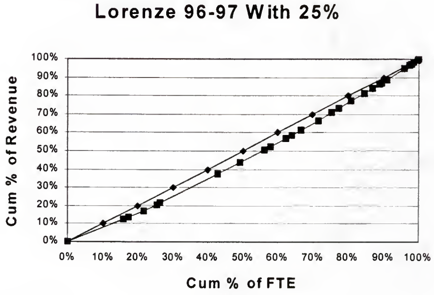

Figure 4-5

Lorenze Curve Projecting School Year 1996-97 with Performance-based Funding at 25% of Total Revenue

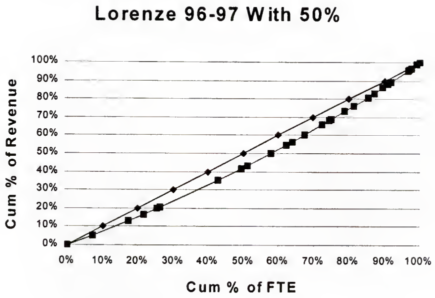

Figure 4-6

Lorenze Curve Projecting School Year 1996-97 with Performance-based Funding at 50% of Total Revenue

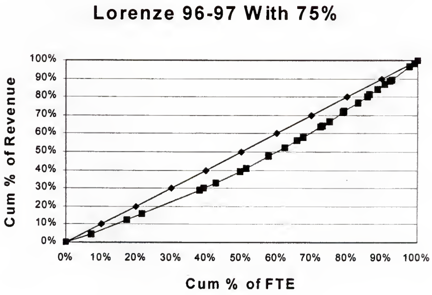

Figure 4 - 7

Lorenze Curve Projecting School Year 1996-97 with Performance-based Funding at 75% of Total Revenue

The Lorenze curves graphically indicated that when performance-based funding was 25% or higher of total revenue, equity in the distribution decreased.

Summary

The results of all data analyzed according to the six statistical measures for horizontal equity established in educational finance indicated that the degree of equity was better in school year 1994-95 prior to the implementation of performance-based funding than for school year 1996-97 with and without performance-based funding (see Tabe 4-8). The range and restricted range calculation indicated the spread in the per-student revenue distribution. The smaller the values in each measure the better the equity of the funding formula. For school year 1994-95, in both measures, the range and restricted range were the lowest when compared to school year 1996-97.

Table 4-8

Statistical Measures for School Years 1994-95 and 1996-97

Statistical Measure	1994-95 Before	1996-97 Without	1996-97 With
Range	$2,705.20	$3,574.63	$3,608.84
Restricted Range	$2,095.25	$2,594.78	$2,628.47
Federal Range Ratio	0.5818	0.6450	0.6456
Coefficient of Variation	0.1343	0.1488	0.1488
McLoone Index	0.9050	0.8813	0.8808
Gini Coefficient	0.0575	0.0602	0.0605

The smaller the federal range ratio, the better the equity of the funding formula. For school year 1994-95, the federal range ratio was lowest when compared to school

year 1996-97 indicating that the funding for school year 1994-95 was more equitable than the funding formula for school year 1996-97.

The coefficient of variation and the Gini coefficient indicated better equity of the distribution if the calculation for each measure was closer to zero. For school year 1994-95, both of the calculations for the coefficient of variation and Gini coefficient were closer to zero indicating that the funding formula for school year 1994-95 was more equitable than for the funding formula for school year 1996-97.

As for the McLoone index that shows equity in the lower half of the distribution, the closer the result was to one, the better the equity for institutions whose revenues were below the median. For school year 1994-95, the McLoone index was closest to one indicating that the funding formula was more equitable in school year 1994-95 for the lower half of the distribution than for school year 1996-97.

For five of the six statistical measures, the degree of equity for the funding formula for the 28 public community colleges in Florida decreased slightly when performance-based funding was implemented (see Table 4-8). When comparing results for the six statistical measures, the range, restricted range, and federal range ratio were lower for the revenue distribution without performance-based funding, indicating equity was better without performance-based funding than with it. The coefficient of variation indicated no change in the funding formula with and without performance-based funding. The Gini coefficient was closer to zero for school year 1996-97 without performance-based funding included in the revenue indicating that the funding program was more equitable without performance-based funding than with it. However, because the calculation was so small (.0003), the shift in equity was minimal. The results for the McLoone index for school year 1996-97 without performance-based funding was closer to one indicating that the

funding program was more equitable without performance-based funding than with it. However, because the difference in the McLoone index was so small (.0005), the shift in equity was minimal.

Results of the projections on the funding model indicated that the degree of equity decreased greatly when appropriations for performance-based funding grew to 25% or higher of total revenue. Federal range ratio, coefficient of variation, McLoone Index, Gini coefficient, and the Lorenze curve all were sensitive to the increase of performance-based funding, thus indicating a decrease in equity.

CHAPTER 5
CONCLUSIONS

Introduction

Considering the fact that community colleges had a total national budget greater than $18 billion in 1995 (Campbell et al., 1996), one can consider that education was, and always will be, a "big business" (Chambers, 1996, p. 90) and a "costly enterprise" (Honeyman & Bruhn, 1996, p.1). However, unlike many other businesses whose commodities are tangible products, the results of education are not tangible. Rather, education affects the lives of the people who participate in it and therefore, affects the citizenry of the country (Boone, 1997; Vaughan, 1995; Witt et al., 1994). Too much funding can make an institution inefficient even though that level of funding can still maintain a high quality of education. On the other hand, too little funding can negatively impact the educational process (Chambers, 1996) and therefore, the well being of the nation (Honeyman & Bruhn, 1996). The equitable and adequate distribution of state funds guaranteed taxpayers and politicians that education would benefit society and be cost effective (McKeown, 1996). Thus the question to many state legislators was how to distribute state funds that was both adequate and equitable to all institutions in the state system (McKeown, 1996). Furthermore, although the funding may be adequate, how does one establish that the funding was equitable?

State legislators and educational officers in their pursuit to find ways to best distribute state funds in an adequate and equitable manner eventually developed funding

formulas (Brinkman, 1988; McKeown, 1996). Researchers were then left to the challenge of developing statistical measures that would establish if funding formulas were equitable. Statistical measures were developed primarily for finance in preK-12 education (Thompson et al., 1994) to analyze horizontal equity (i.e., equal treatment of equals). Statistical measurements used in horizontal equity studies were range, restricted range, federal range ratio, coefficient of variation, McLoone index, and the Gini coefficient with the Lorenze curve (Thompson et al., 1994). Since the early 1980s, the statistical measures common to the preK-12 system became useful to higher education as researchers examined the equitable nature of funding mechanisms for community college systems (Harrell, 1992; Loftus, 1983).

While researchers were examining the equitable nature of funding formulas for community college systems, a change took place across the nation that began to change the method of funding. The change was performance-based funding that was not based on the enrollment but based on productivity outcomes such as the number of students who matriculated (Campbell et al., 1996). The shift to performance-based funding was a shift from a "goal of equity and adequacy to a goal of accountability and efficiency" (McKeown, 1996, p. 61). Therefore, the question asked was how would the performance allocation effect horizontal equity on a funding formula?

The purpose of this study was to extend the concept of fiscal equity in community colleges by testing the effects of statistical measurements prevalent in public school equity studies on a community college funding system. A further purpose was to examine the change in fiscal equity resulting from the implementation of a performance-based funding system on a state wide multi-institution community college program. The public community college system in the state of Florida was chosen for the study. The State

Board of Community Colleges governed the community college system (FLA. STAT. ch. 240.311 [Supp. 1994]) that consisted of 28 public colleges (FLA. STAT. ch. 240.3031, [1993]) having common definition, mission, and responsibilities (FLA. STAT. ch. 240.301[Supp. 1994]). Funding to the community colleges was allocated through the Community College Program Fund (CCPF) (FLA. STAT. ch. 240.347 [1993]).

Using the statistical measurements for equity developed for the public school finance studies, the researcher analyzed the degree of horizontal equity on total revenue per full-time equivalent student (per-student revenue) for the 28 public community colleges in the state of Florida prior to and following the implementation of performance-based funding. Total revenue was considered funding from the state's General Revenue Fund, lottery proceeds, and student fees. The state's General Revenue appropriation for the community college system included funds to the Community College Program Fund with the addition of non-reoccurring allocations. Non-reoccurring allocations were special allocations included in a specific year's funding but not added to the base for continuance in the next fiscal year's budget. For the year when performance-based funding was implemented, the state's General Revenue appropriation to the Community College Program Fund was considered with and without the performance allocation of $12 million. Per-student revenue was calculated by taking the total revenue and dividing it by the full-time equivalent student count (FTE).

The study used population data on the 28 public community colleges in Florida for school year 1994-95, before implementation of performance-based funding, and school year 1996-97 when performance-based funding was implemented for the community college system. The Florida Department of Education, Division of Community Colleges (1999), provided data from the financial database on a CD-ROM.

The data included revenue allocated through the Community College Program Fund from the state's General Revenue Fund, student fees, lottery proceeds, and enrollment in the form of FTE. The objective of the study was to analyze the degree of equity for each year's funding formula to ascertain if performance-based funding made a difference in horizontal equity (i.e., the equal treatment of equals). Thus, the questions asked were:

1. What were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding?
2. What were the effects on the degree of horizontal equity upon Florida's funding formula for the 28 public community colleges when performance-based funding was implemented?

The findings for the first research question--what were the changes in horizontal equity for Florida's funding formula for the 28 public community colleges prior to and following the implementation of performance-based funding--were obtained through the use of horizontal equity measures. The horizontal equity measures used were range, restricted range, federal range ratio, coefficient of variation, and the Gini coefficient with the Lorenze curve. Data obtained from the Department of Education, Division of Community Colleges (1999), were analyzed for school year 1994-95 (prior to the implementation of performance-based funding) and school year 1996-97 (after the implementation). Based on the calculations from the six horizontal equity measures, Florida's funding formula for the 28 public community colleges was more equitable in school year 1994-95 prior to the implementation of performance-based funding for all public community colleges in 1996-97 (see Table 4-8). Six statistical measures used in preK-12 education finance to determine the horizontal degree of equity were range,

restricted range, coefficient of variation, federal range ratio, McLoone index, Gini coefficient with the Lorenze curve. When the six statistical measurements were applied to Florida's community college funding formula, the results indicated that the degree of equity decreased the year performance-based funding was introduced. The federal range ratio, coefficient of variation, and McLoone index indicated the decrease in the degree of equity most prominently.

The six horizontal equity measurements were used to analyze the second research question--what were the effects on the degree of horizontal equity upon Florida's funding formula for the 28 public community college when performance-based funding was implemented. Data obtained from the Department of Education, Division of Community Colleges (1999), were analyzed for school year 1996-97 with and without performance-based funding. The findings from five of the six statistical measures indicated that although there was a slight decrease in the degree of equity when performance-based funding was included in the revenue, the change was so small that the effect of performance-based on the funding formula was minimal (see Table 4-8).

For school year 1996-97 there was only a slight change in the degree of equity when comparing findings with and without performance-based funding. However, one must consider the amount of revenue tied to performance-based funding. For school year 1996-97, performance-based funding was only 1.3% of total revenue. Therefore, one would expect the affect of performance-based funding on the equity of a funding formula to be minimal. In order to establish what effect performance-based funding would have on equity for a funding formula, the researcher projected what would happen if the allocation for performance-based funding increased from 1.3% of total revenue to 6%, 12%, 25%, 50%, and 75% using the 1996-97 funding formula as a model. Results indicated that when

performance-based funding became close to 12% of total revenue,the degree of equity decreased. When performance-based funding was 25% or higher of total revenue, the degree of equity in the funding formula decreased.

The results of the study resulted in two conclusions. The first conclusion was that the statistical measures prevalent to public school equity studies were sensitive to changes in revenue and therefore, applicable to the community college setting. Secondly, the analysis of the data indicated that the degree of equity decreased when performance-based funding was added to the funding system, thus resulting in implications for public policy makers.

Applications of the Statistical Measurements to the Community College Setting

The results of this study extended the concept of horizontal equity by examining the funding formula for Florida's community college system four years after Harrell's (1992) study. For school year 1989-90, the value of the federal range ratio was 0.3041 whereas for school year 1994-95 the federal range ratio was 0.5818. The coefficient of variation for school year 1989-90 was 0.0981 whereas, for school year 1994-95 the coefficient of variation was 0.1343. The McLoone index for school year 1989-90 was 0.9144 whereas, for school year 1994-95 the index was 0.9050. The Gini coefficient for school year 1989-90 was 0.0547 whereas, for school year 1994-95 the coefficient was 0.0575. When comparing these values, there was a decrease in the degree of equity for Florida's funding formula for the 28 community colleges from school year 1989-90 when Harrell (1992) did his study to 1994-95 when this study was done. The decrease in the degree of equity was evident for all statistical measurements mentioned.

The statistical measurements were sensitive to changes in the revenue when comparing 1989-90 results with 1996-97 results. The federal range ratio in 1989-90 was

0.3041 whereas in 1996-97 with performance-based funding (PBF) the federal range ratio was 0.6456 and without PBF the federal range ratio was 0.6450. The coefficient of variation in 1989-90 was 0.0981 whereas in 1996-97 with or without PBF the coefficient of variation was 0.1488. The McLoone index for 1989-90 was 0.9144 whereas in 1996-97 with PBF the value was 0.8808 and without PBF the value was 0.8813. The Gini coefficient for 1989-90 was 0.0547 whereas for 1996-97 with PBF the value was 0.0605 and without PBF the value was 0.602. When comparing these values, there was a decrease in the degree of equity for Florida's funding formula for the 28 community colleges from school year 1989-90 to school year 1996-97 without performance-based funding. All measures indicated that the degree of equity for the funding formula decreased even more when the performance allocation was added.

Comparing the values from school years 1989-90 to 1994-95 and comparing values from 1989-90 to 1996-97 with and without performance allocation showed that the statistical measurements used in public school finance studies can be extended to community college finance studies because the measurements were sensitive to changes in per-student revenue.

The range was considered the "most commonly used measure of inequality" (Bezeau, 1979, p. 135) but was considered the "least acceptable" (Bezeau, 1979, p. 135) for public school equity studies. The range was limited as a measure for equity "because it is based on only two values, does not show patterns of variation, and is not sensitive to changes in the distribution" (Thompson et al., 1994, p. 248). The results of this study showed that the range examined the spread in per-student revenue, but when taken alone, the range was the least acceptable measure in the community college setting. The range

considered only the two extremes of the distribution and did not determine variations between other observations.

The restricted range for public school equity studies was considered a more useful indicator for equity than the range because the restricted range excluded extremes above the 95th percentile and below the 5th percentile. By taking the observations at the 5th percentile and 95th percentile, the restricted range eliminated "the effect of misrepresentative values above and below these extremes" (Thompson et al., 1994, pl. 248). The restricted range, however, did not determine variation between the other observations. The results of this study indicated that the restricted range had the same limitations in community college setting. The restricted range eliminated extreme observations that could distort the distribution but did not determine variation between the other observations in the distribution.

The federal range ratio had the same restrictions as the restricted range for public school equity studies because it was based on the restricted range (Thompson et al., 1994). The federal range ratio expressed how much larger the observation at the 95th percentile was than the observation at the 5th percentile (Hirth, 1994, p. 174). Likewise for the community college setting, the federal range ratio presented a clearer picture between the per-student revenue at the 5th percentile and the per-student revenue at the 95th percentile expressing how much larger the per-student revenue at the 95th percentile was over the per-student revenue at the 5th percentile.

The coefficient of variation was a useful indicator of equity in public school finance studies because it was unitless and independent of the mean but measured variation about the mean (Bezeau, 1979) and was "completely acceptable on theoretical grounds" (Bezeau, 1979, p. 138). The coefficient of variation revealed the variation in revenue for

given proportions of students in the state (King, 1983, p. 74). The results of this study showed that the coefficient of variation was a useful equity indicator for the community college setting. The coefficient of variation was unitless, measured variation about the mean, and revealed variations in revenue for given proportions of full-time equivalent student counts.

McLoone index was a measurement "unique to school finance that was designed to demonstrate the degree of equity in the bottom half of the distribution" (Thompson et al., 1994, p. 250). The McLoone index was "constructed in such a fashion that its value should rise as fewer dollars were needed to raise all districts below the median expenditures to the median expenditure" (Hickrod et al., 1980, p. 182). The school of thought for developing the McLoone index was that the state's only "legitimate concern" was to increase those school districts whose per-pupil expenditures were below the median (Hickrod et al., 1980). The results of this study indicated that the McLoone index was as applicable to community college equity studies as it was to public school equity studies. The McLoone index measured the degree of equity in the bottom half of the per-student revenue distribution. The higher the value of the McLoone index, the fewer dollars needed to bring up the bottom half of the distribution to the median per-student revenue.

The Gini coefficient was a useful measure for equity in public school finance studies because it was "unitless, independent of the mean, obeys the principle of transfers, and was independent of population size" (Bezeau, 1979). The difference for this statistical measure when considered for community colleges was the fact that, for public school finance studies the Gini coefficient was based upon the wealth of the school district (local taxes). In addition, the measure referred to expenditures not revenue. Harrell (1992) defined wealth as the sum of state revenue and student fees. Harrell (1992) also made the

assumption that "revenues closely approximated expenditures on an institutional level" (p. 48), thereby allowing the use of the Gini coefficient and Lorenze curve in the community college setting. Using the same definition of wealth and the assumption developed by Harrell (1992), the results of this study extended the Gini coefficient and Lorenze curve to the community college setting with the inclusion of a performance allocation. The Gini coefficient and Lorenze curve were sensitive to changes in per-student revenue and, therefore, useful as an equity measurement in the community college setting.

The range and restricted range were not useful equity indicators for projections of the funding model. The projections inflated per-student revenue with arbitrary numbers. Therefore, to identify the highest and the lowest observation would be needless. Although the federal range ratio was dependent on the restricted range, the federal range ratio was more useful as an indicator for equity on the projected spread because it established how many times greater the 95th percentile observation was over the 5th percentile observation. In this way, one could ascertain the change that could occur in the spread if performance-based funding increased. The coefficient of variation and the Gini coefficient were very useful as indicators for equity in the projections because both measured variability around a specific item, namely the mean and the perfect-equity line. The McLoone index was a useful indicator for equity in the projections because it was a ratio concerned with the lower half of the distribution allowing one to consider how far off the projections would be in predicting what percentage of students were receiving what percentage of revenues.

As more equity studies are done using these statistical measures, the repeated use of these measures will firmly establish a well-described and accepted methodology for measuring the degree of equity in community college equity studies. As performance-based funding continues to grow replacing funding formulas, community college equity

studies will be vital in monitoring the economic success or failure of the funding program to provide "fairness" in the distribution process.

Implications for Public Policy Makers

The results of this study indicated that the degree of equity for the funding formula for Florida's 28 public community colleges decreased from school year 1994-95 to 1996-97 with performance-based funding. The study also showed that for school year 1996-97, when analyzing data with and without performance-based funding, the addition of the performance-based allocation resulted in a decrease in the degree of equity. When comparing the results of this study to Harrell's (1992) from his study four years earlier, the degree of equity in the funding formula decreased since school year 1989-90. If Florida legislators are interested in the equity objective for distributing funding, they should seriously consider the impact the decrease of equity would have on the funding distribution if the situation is not corrected. The spread between the lowest and highest per-student revenue would continue to increase. Variations between institutions' per-student revenues about the mean would continue to increase. The bottom half of the distribution would move farther away from the median. Too much funding to an institution can make an institution inefficient even though that level of funding can still maintain a high quality of education. On the other hand, too little funding can negatively impact the educational process (Chambers, 1996) and therefore, the well being of the nation (Honeyman & Bruhn, 1996). To correct the inequity situation, Florida legislators should take action to adjust revenue allocations to increase "fairness" in the distribution. Additional revenue for colleges between the highest and lowest per-student revenue would result in a decrease in variations about the mean, increase the median per-student revenue,

improve the those colleges who per-student revenues are below the median, and increase the degree of horizontal equity in the funding system.

Results of the projections indicated that the degree of equity decreased when allocations for performance-based funding grew to 12% or higher of total revenue. If Florida legislators continue to support the concept that funding formulas should be equitable for all public community colleges in the state system, the allocation for the performance-based funding should continue to remain a small percentage of the total revenue package. According to the projections for the 1996-97 funding methodology, a decrease in equity began to take place when the performance-based allocation was at 12% of total revenue when considering the Gini coefficient and McLoone index. The degree of equity decreased greatly in all measures analyzed when the performance-based allocation was 25% or higher of total revenue. Thus, from this study, if Florida legislators continue to support the concept of equitable distribution of funds, performance-based funding should remain at the level it is or should not exceed 12% of total revenue.

Performance-based funding was introduced to most funding programs for two reasons. Promoters of the concept whether they be state legislators or state governing boards were concerned with institutional improvement and accountability for dollars received in funding. The challenge for any state was to decide at what levels performance should be funded. As Serban (1998) stated, "performance funding allocations should not be at such a low level that institutional interest wanes or at such a high level that budget instability results" (p. 67). Florida's performance-based funding was 1.3% of total revenue in 1996-97. No changes in the degree of equity occurred until performance-funding levels were at a 12%. If Florida legislators are serious about institutional improvement via external accountability through performance measures, the allocation for performance-

based funding should increase. Performance-funding levels could be as high as 10% of total revenue and still be equitable.

Future Studies

Using this study as a baseline, future studies should be conducted in the years to follow to analyze the degree of horizontal equity on the Florida funding formula to ascertain how performance-based funding continued to affect the degree of equity.

Using the statistical measurements from this study, horizontal fiscal equity studies should be done on other state community college funding systems to firmly establish the methodology in the community college setting.

Performance-based funding was introduced to funding systems as a way to improve institutions and to hold institutions accountable for dollars received in funding. As this study has pointed out, accountability was in the form of student success and achievement. Future studies could be done to determine:

1. How the performance-based funding initiative impacted student success and achievement.
2. How institutions improved through the use of performance-based funding.
3. The degree of equity on other state community college systems that have performance-based funding.
4. The shift in equity on a program-by-program basis (i.e., AA, AS, vocational).

APPENDIX
RAW DATA

Table 1

1994-1995 Total Revenue Prior to Performance-based Funding

College	Student Fees	General Revenue	Lottery	Total Revenue
Brevard	8,389,853	22,964,412	5,645,080	36,999,345
Broward	17,781,298	31,781,666	9,255,855	58,818,819
Central Florida	4,372,647	9,028,137	2,971,717	16,372,501
Chipola	1,489,693	5,305,082	1,071,263	7,866,038
Daytona Beach	8,258,780	23,030,467	7,245,347	38,534,594
Edison	5,777,237	10,927,763	3,234,389	19,939,389
Fl. CC @ Jax	14,505,647	44,942,135	12,315,724	71,763,506
Florida Keys	1,055,984	3,822,973	622,857	5,501,814
Gulf Coast	3,633,825	8,304,543	2,312,436	14,250,804
Hillsborough	12,374,712	25,342,690	6,932,822	44,650,224
Indian River	6,090,858	17,639,060	5,186,568	28,916,486
Lake City	1,924,135	7,766,913	1,638,873	11,329,921
Lake-Sumter	1,331,524	4,122,308	859,099	6,312,931
Manatee	5,212,740	11,153,148	3,228,514	19,594,402
Miami-Dade	41,948,235	85,733,368	22,757,089	150,438,692
North Florida	589,866	3,525,736	577,762	4,693,364
Okaloosa-Walton	3,460,267	8,880,611	2,541,816	14,882,694
Palm Beach	11,216,899	21,184,644	6,445,973	38,847,516
Pasco-Hernando	3,158,850	7,312,321	2,515,123	12,986,294
Pensacola	6,724,577	23,388,598	5,820,961	35,934,136
Polk	3,660,992	8,489,328	2,292,105	14,442,425
St. Johns River	1,917,048	5,317,156	1,333,698	8,567,902
St. Petersburg	13,604,400	26,650,864	7,756,286	48,011,550
Santa Fe	9,566,466	19,274,929	5,249,243	34,090,638
Seminole	5,368,902	16,220,170	4,850,197	26,439,269
South Florida	1,308,418	7,326,660	1,743,049	10,378,127
Tallahassee	6,817,081	13,168,150	3,574,582	23,559,813
Valencia	14,984,784	25,697,629	7,732,173	48,414,586
Totals	**216,525,718**	**498,301,461**	**137,710,601**	**852,537,780**

Table 2

1994-1995 Total Revenue Per Full-time Equivalent Student (FTE)
Prior to Performance-based Funding

College	Total Revenue	Actual FTE	Total Revenue Per FTE
Brevard	36,999,345	7,239.7	5,110.62
Broward	58,818,819	12,495.0	4,707.39
Central Florida	16,372,501	3,731.2	4,388.00
Chipola	7,866,038	1,380.9	5,696.31
Daytona Beach	38,534,594	10,771.2	3,577.56
Edison	19,939,389	4,640.2	4,297.10
Fl. CC @ Jax	71,763,506	18,776.0	3,822.09
Florida Keys	5,501,814	875.7	6,282.76
Gulf Coast	14,250,804	3,269.0	4,359.38
Hillsborough	44,650,224	10,091.3	4,424.63
Indian River	28,916,486	8,030.0	3,601.06
Lake City	11,329,921	2,090.7	5,419.20
Lake-Sumter	6,312,931	1,187.7	5,315.26
Manatee	19,594,402	4,053.6	4,833.83
Miami-Dade	150,438,692	31,610.6	4,759.12
North Florida	4,693,364	879.1	5,338.83
Okaloosa-Walton	14,882,694	3,489.5	4,264.99
Palm Beach	38,847,516	8,634.2	4,499.26
Pasco-Hernando	12,986,294	2,937.3	4,421.17
Pensacola	35,934,136	7,382.0	4,867.80
Polk	14,442,425	3,053.9	4,729.17
St. Johns River	8,567,902	2,099.6	4,080.73
St. Petersburg	48,011,550	10,182.1	4,715.29
Santa Fe	34,090,638	7,821.2	4,358.75
Seminole	26,439,269	6,920.1	3,820.65
South Florida	10,378,127	2,579.8	4,022.84
Tallahassee	23,559,813	5,036.9	4,677.44
Valencia	48,414,586	11,469.1	4,221.31
Totals	**852,537,780**	**192,727.6**	**4,423.54**

Table 3

1996-1997 Total Revenue with Performance-based Funding

College	Student Fees	General Rev (With)	Lottery	Total Revenue
Brevard	8,571,992	25,523,679	4,712,330	38,808,001
Broward	17,772,937	38,894,651	7,933,043	64,600,631
Central Florida	4,360,949	10,541,849	2,729,157	17,631,955
Chipola	1,391,208	5,883,029	1,722,208	8,996,445
Daytona Beach	8,414,670	27,726,049	7,292,894	43,433,613
Edison	5,953,094	14,263,087	2,964,493	23,180,674
Fl. CC @ Jax	15,300,885	50,761,500	11,829,316	77,891,701
Florida Keys	959,242	4,405,188	570,735	5,935,165
Gulf Coast	3,754,045	10,414,436	2,113,745	16,282,226
Hillsborough	12,009,546	30,227,266	6,067,454	48,304,266
Indian River	6,326,057	22,168,267	5,376,069	33,870,393
Lake City	1,715,868	8,705,269	1,339,518	11,760,655
Lake-Sumter	1,383,667	4,577,990	766,077	6,727,734
Manatee	5,196,300	12,702,154	2,485,180	20,383,634
Miami-Dade	42,232,834	98,788,851	20,210,088	161,231,773
North Florida	643,545	3,932,436	572,177	5,148,158
Okaloosa-Walton	3,677,594	10,724,738	2,202,638	16,604,970
Palm Beach	11,616,748	24,124,650	5,894,546	41,635,944
Pasco-Hernando	2,932,071	9,927,362	1,813,736	14,673,169
Pensacola	6,817,521	26,018,502	4,596,584	37,432,607
Polk	3,497,267	9,659,272	1,865,675	15,022,214
St. Johns River	1,843,115	6,643,403	1,308,863	9,795,381
St. Petersburg	13,385,298	31,768,029	6,232,243	51,385,570
Santa Fe	10,441,810	22,390,813	4,780,717	37,613,340
Seminole	5,496,661	18,974,814	4,230,333	28,701,808
South Florida	1,271,735	8,289,078	1,784,016	11,344,829
Tallahassee	6,880,113	14,985,857	3,081,453	24,947,423
Valencia	17,639,149	33,938,328	7,589,713	59,167,190
Totals	**221,485,921**	**586,960,547**	**124,065,001**	**932,511,469**

Table 4

1996-1997 General Revenue with Performance-based Funding

College	General Rev (Without)	Performance Allocation	General Rev (With)
Brevard	24,927,122	596,557	25,523,679
Broward	38,166,002	728,649	38,894,651
Central Florida	10,209,641	332,208	10,541,849
Chipola	5,772,283	110,746	5,883,029
Daytona Beach	27,302,192	423,857	27,726,049
Edison	13,861,635	401,452	14,263,087
Fl. CC @ Jax	49,828,055	933,445	50,761,500
Florida Keys	4,348,050	57,138	4,405,188
Gulf Coast	10,186,175	228,261	10,414,436
Hillsborough	29,559,501	667,765	30,227,266
Indian River	21,763,414	404,853	22,168,267
Lake City	8,515,904	189,365	8,705,269
Lake-Sumter	4,496,339	81,651	4,577,990
Manatee	12,430,703	271,451	12,702,154
Miami-Dade	97,401,564	1,387,287	98,788,851
North Florida	3,850,523	81,913	3,932,436
Okaloosa-Walton	10,515,206	209,532	10,724,738
Palm Beach	23,554,283	570,367	24,124,650
Pasco-Hernando	9,659,077	268,285	9,927,362
Pensacola	25,559,590	458,912	26,018,502
Polk	9,402,145	257,127	9,659,272
St. Johns River	6,543,608	99,795	6,643,403
St. Petersburg	30,846,791	921,238	31,768,029
Santa Fe	21,783,218	607,595	22,390,813
Seminole	18,615,508	359,306	18,974,814
South Florida	8,182,951	106,127	8,289,078
Tallahassee	14,552,108	433,749	14,985,857
Valencia	33,126,959	811,369	33,938,328
Totals	**574,960,547**	**12,000,000**	**586,960,547**

Table 5

1996-1997 Total Revenue per Full-time Equivalent Student (Fte) with Performance-based Funding

College	Total Revenue	Actual FTE	Total Revenue Per FTE
Brevard	38,808,001	7,137.8	5,436.97
Broward	64,600,631	12,660.5	5,102.53
Central Florida	17,631,955	3,521.7	5,006.66
Chipola	8,996,445	1,342.8	6,699.77
Daytona Beach	43,433,613	10,699.7	4,059.33
Edison	23,180,674	4,365.8	5,309.61
Fl. CC @ Jax	77,891,701	19,131.9	4,071.30
Florida Keys	5,935,165	774.0	7,668.17
Gulf Coast	16,282,226	3,180.1	5,120.04
Hillsborough	48,304,266	9,015.1	5,358.15
Indian River	33,870,393	8,102.8	4,180.09
Lake City	11,760,655	1,861.9	6,316.48
Lake-Sumter	6,727,734	1,122.8	5,991.93
Manatee	20,383,634	3,560.8	5,724.45
Miami-Dade	161,231,773	30,568.3	5,274.48
North Florida	5,148,158	853.3	6,033.23
Okaloosa-Walton	16,604,970	3,311.9	5,013.73
Palm Beach	41,635,944	8,318.9	5,004.98
Pasco-Hernando	14,673,169	2,617.5	5,605.80
Pensacola	37,432,607	6,643.0	5,634.89
Polk	15,022,214	2,719.7	5,523.48
St. Johns River	9,795,381	2,019.9	4,849.44
St. Petersburg	51,385,570	9,236.1	5,563.56
Santa Fe	37,613,340	7,216.9	5,211.84
Seminole	28,701,808	6,802.6	4,219.24
South Florida	11,344,829	2,623.0	4,325.13
Tallahassee	24,947,423	4,975.0	5,014.56
Valencia	59,167,190	12,135.0	4,875.75
Totals	**932,511,469**	**186,518.8**	**4,999.56**

Table 6

1996-1997 Total Revenue without Performance-based Funding

College	Student Fees	General Rev (Without)	Lottery	Total Revenue
Brevard	8,571,992	24,927,122	4,712,330	38,211,444
Broward	17,772,937	38,166,002	7,933,043	63,871,982
Central Florida	4,360,949	10,209,641	2,729,157	17,299,747
Chipola	1,391,208	5,772,283	1,722,208	8,885,699
Daytona Beach	8,414,670	27,302,192	7,292,894	43,009,756
Edison	5,953,094	13,861,635	2,964,493	22,779,222
Fl. CC @ Jax	15,300,885	49,828,055	11,829,316	76,958,256
Florida Keys	959,242	4,348,050	570,735	5,878,027
Gulf Coast	3,754,045	10,186,175	2,113,745	16,053,965
Hillsborough	12,009,546	29,559,501	6,067,454	47,636,501
Indian River	6,326,057	21,763,414	5,376,069	33,465,540
Lake City	1,715,868	8,515,904	1,339,518	11,571,290
Lake-Sumter	1,383,667	4,496,339	766,077	6,646,083
Manatee	5,196,300	12,430,703	2,485,180	20,112,183
Miami-Dade	42,232,834	97,401,564	20,210,088	159,844,486
North Florida	643,545	3,850,523	572,177	5,066,245
Okaloosa-Walton	3,677,594	10,515,206	2,202,638	16,395,438
Palm Beach	11,616,748	23,554,283	5,894,546	41,065,577
Pasco-Hernando	2,932,071	9,659,077	1,813,736	14,404,884
Pensacola	6,817,521	25,559,590	4,596,584	36,973,695
Polk	3,497,267	9,402,145	1,865,675	14,765,087
St. Johns River	1,843,115	6,543,608	1,308,863	9,695,586
St. Petersburg	13,385,298	30,846,791	6,232,243	50,464,332
Santa Fe	10,441,810	21,783,218	4,780,717	37,005,745
Seminole	5,496,661	18,615,508	4,230,333	28,342,502
South Florida	1,271,735	8,182,951	1,784,016	11,238,702
Tallahassee	6,880,113	14,552,108	3,081,453	24,513,674
Valencia	17,639,149	33,126,959	7,589,713	58,355,821
Totals	**221,485,921**	**574,960,547**	**124,065,001**	**920,511,469**

Table 7

1996-1997 Total Revenue Per Full-time Equivalent Student (FTE) without Performance-based Funding

College	Total Revenue (Without)	Actual FTE	Total Revenue Per FTE
Brevard	38,211,444	7,137.8	5,353.39
Broward	63,871,982	12,660.5	5,044.98
Central Florida	17,299,747	3,521.7	4,912.33
Chipola	8,885,699	1,342.8	6,617.29
Daytona Beach	43,009,756	10,699.7	4,019.72
Edison	22,779,222	4,365.8	5,217.65
Fl. CC @ Jax	76,958,256	19,131.9	4,022.51
Florida Keys	5,878,027	774.0	7,594.35
Gulf Coast	16,053,965	3,180.1	5,048.26
Hillsborough	47,636,501	9,015.1	5,284.08
Indian River	33,465,540	8,102.8	4,130.12
Lake City	11,571,290	1,861.9	6,214.78
Lake-Sumter	6,646,083	1,122.8	5,919.20
Manatee	20,112,183	3,560.8	5,648.22
Miami-Dade	159,844,486	30,568.3	5,229.09
North Florida	5,066,245	853.3	5,937.24
Okaloosa-Walton	16,395,438	3,311.9	4,950.46
Palm Beach	41,065,577	8,318.9	4,936.42
Pasco-Hernando	14,404,884	2,617.5	5,503.30
Pensacola	36,973,695	6,643.0	5,565.81
Polk	14,765,087	2,719.7	5,428.94
St. Johns River	9,695,586	2,019.9	4,800.03
St. Petersburg	50,464,332	9,236.1	5,463.81
Santa Fe	37,005,745	7,216.9	5,127.65
Seminole	28,342,502	6,802.6	4,166.42
South Florida	11,238,702	2,623.0	4,284.67
Tallahassee	24,513,674	4,975.0	4,927.37
Valencia	58,355,821	12,135.0	4,808.89
Totals	**920,511,469**	**186,518.8**	**4,935.22**

Table 8

School Year 1994-95 Prior to Performance-based Funding Per-student Revenue Below and Above the Median

Colleges	Per-student Revenue	FTE
Below the Median		
Daytona Beach	3,577.56	10,771.2
Indian River	3,601.06	8,030.0
Seminole	3,820.65	6,920.1
FL. CC @ Jax	3,822.09	18,776.0
South Florida	4,022.84	2,579.8
St. Johns River	4,080.73	2,099.6
Valencia	4,221.31	11,469.1
Oklahoosa-Walton	4,264.99	3,489.5
Edison	4,297.10	6,640.2
Santa Fe	4,358.75	7,821.2
Gulf Coast	4,359.38	3,269.0
Central Florida	4,388.00	3,731.2
Pasco-Hernando	4,421.17	2,937.3
Hillsborough	4,242.63	10,091.3
Above the Median		
Palm Beach	4,499.26	8,634.2
Tallahassee	4,677.44	5,036.9
Broward	4,707.39	12,495.0
St. Petersburg	4,715.29	10,182.1
Polk	4,729.19	3,053.9
Miami Dade	4,759.12	31,610.6
Manatee	4,833.83	4,045.6
Pensacola	4,867.80	7,382.0
Brevard	5,110.62	7,239.7
Lake-Sumter	5,315.26	1,187.7
North Florida	5,338.83	879.1
Lake City	5,419.20	2,090.7
Chipola	5,696.31	1,380.9
Florida Keys	6,282.76	875.7

Table 9

School Year 1996-97 Without Performance-based Funding Per-student Revenue Above and Below the Median

Colleges	Per-student Revenue	FTE
Below the Medium		
Daytona Beach	4,019.72	10,699.7
FL. CC @ Jax	4,022.51	19,131.9
Indian River	4,130.12	8,102.8
Seminole	4,166.42	6,802.6
South Florida	4,284.67	2,623.0
St. Johns River	4,800.03	2,019.9
Valencia	4,808.89	12,135.0
Palm Beach	4,936.42	8,318.9
Central Florida	4,912.33	3,521.7
Oklaloosa-Walton	4,950.46	3,311.9
Tallahassee	4,927.37	4,975.0
Broward	5,044.98	12,660.5
Gulf Coast	5,048.26	3,180.1
Santa Fe	5,127.65	7,216.9
Above the Median		
Miami Dade	5,229.09	30,568.3
Edison	5,217.65	4,365.8
Hillsborough	5,284.08	9,015.1
Brevard	5,353.39	7,137.8
Polk	5,428.94	2,719.7
St. Petersburg	5,463.81	9,236.1
Pasco-Hernando	5,503.30	2,617.5
Pensacola	5,565.81	6,643.0
Manatee	5,648.22	3,560.3
Lake-Sumter	5,919.20	1,122.8
North Florida	5,937.24	853.3
Lake City	6,214.78	1,861.9
Chipola	6,617.29	1,342.8
Florida Keys	7,594.35	774

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BIOGRAPHICAL SKETCH

Rhodella Brown obtained her bachelor's degree from the State University College of New York at Buffalo in secondary math education and her master's degree from the State University College of New York at Fredonia. She has taught in both secondary and higher education.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

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